2018 Utility Honorees

Utility of the Future Today

With Support From

For the third year, the partnership of water sector organizations - the National Association of Clean Water Agencies (NACWA), the Water Environment Federation (WEF), the Water Research Foundation (WRF), and the WateReuse Association – with input from the U.S. Environmental Protection Agency (EPA) – proudly announce the 2018 Utility of the Future Today (UOTF) Recognition Program recipients.

The 2018 program celebrates the exceptional performance of 32 public and private water resource recovery facilities across the U.S. and around the world selected by a peer committee of utility general managers and executives for innovation in community engagement, watershed stewardship, and the recovery of resources such as water, energy, and nutrients.

The recipients were recognized and honored during an October 2, 2018 ceremony held in conjunction with WEFTEC 2018 in New Orleans — WEF's 91st annual technical exhibition and conference—as well as a number of commensurate events sponsored by the partners.

The recipients receive a display flag (below) and a special certificate to further identify and promote their outstanding achievement as a Utility of the Future Today.

The UOTF concept was introduced in 2013 to guide utilities of all sizes toward smarter, more efficient operations and a progression to full resource recovery with enhanced productivity, sustainability, and resiliency. Since then many utilities have successfully implemented new and creative programs to address local wastewater and water technical and community challenges. The Utility of the Future Today Recognition Program seeks applications from national and global water systems that are transforming operations through technology, communication and innovative solutions and that have performance results as evidence.

Innovation and technology are foundational criteria for this recognition and are the basis for providing a distinction between well-run utilities and those going beyond traditional operational practices toward visionary performance.

Since 2016, the partnership has honored 105 utilities meeting the criteria of the UOTF Today Program. The partnership will continue to seek organizations that build on their success by celebrating their advancements and experiences, and by encouraging the adoption of the UOTF principles which enable organizations across a broad range of capacities and capabilities to collaborate, learn and continue to evolve as a unified sector.

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The Utility of the Future Today Joint Partnership

About WEF

The Water Environment Federation is a not-for-profit technical and educational organization of 34,000 individual members and 75 affiliated Member Associations representing water quality professionals around the world. Since 1928, WEF and its members have protected public health and the environment. As a global water sector leader, our mission is to connect water professionals, enrich the expertise of water professionals, increase the awareness of the impact and value of water, and provide a platform for water sector innovation. To learn more, visit www.wef.org.

About NACWA

For nearly 50 years, the National Association of Clean Water Agencies (NACWA) has been the nation's recognized leader in legislative, regulatory and legal advocacy on the full spectrum of clean water issues. NACWA represents public wastewater and stormwater agencies of all sizes nationwide. Our unique and growing network strengthens the advocacy voice for all member utilities, and ensures they have the tools necessary to provide affordable and sustainable clean water for all. Our vision is to represent every utility as a NACWA member, helping to build a strong and sustainable clean water future. For more information, visit us at www.nacwa.org.

About WRF

The Water Research Foundation is a 501c3 organization officially formed in January 2018 after the merger of the Water Environment & Reuse Foundation and Water Research Foundation. The merged Foundation is the leading water research organization, funding research, pilot projects, and technology demonstrations that maximize the value of all water, including wastewater, stormwater, drinking water, and recycled water. Learn more at www.werf.org or www.waterrf.org.

About the WateReuse Association

The WateReuse Association is the nation's only trade association solely dedicated to advancing laws, policy, funding, and public acceptance of recycled water. The WateReuse Association represents a coalition of utilities that recycle water, businesses that support the development of recycled water projects, and users of recycled water. Our members are incorporating water reuse into their water management strategies as a proven method for ensuring a safe, reliable, locally controlled water supply. To learn more, visit www.watereuse.org.

Utility of the Future Today Background

The "Water Resources Utility of the Future" was first articulated in a 2013 publication jointly prepared by the National Association of Clean Water Agencies (NACWA), the Water Environment Federation (WEF), and the Water Environment Research Foundation (WERF). *The Water Resources Utility of the Future: A Blueprint for Action* sought to capture in one place current, emergent, and possible wastewater utility opportunities that, packaged together, presented a revolutionary future for the sector. That revolution would transform the traditional wastewater treatment system to a community-based resource recovery center and leader in the overall sustainability and resilience of the communities they serve. This Recognition Program has been specifically designed to further promote and enable the emergence of this new business model for the sector, provide recognition for those achieving these outcomes, and encourage peer-to-peer learning among utility members of the Recognition Program and with other utilities.

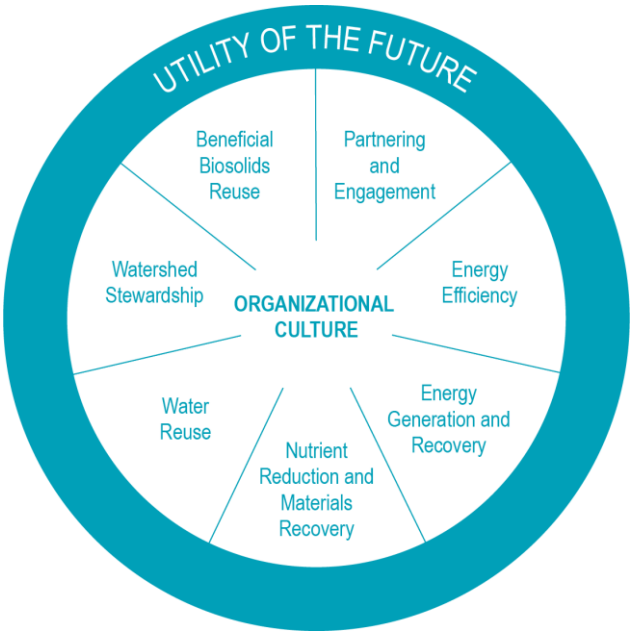
The sponsoring organizations for this recognition program understand that substantial excellence in the operations of wastewater treatment systems exists today. Many utilities optimize and continually improve their operations, consistently meet or exceed their regulatory requirements, plan and invest effectively for the maintenance, repair and replacement of their infrastructure, and engage their employees and communities in meaningful and productive ways.

While a variety of initiatives exist to promote and acknowledge excellent performance and sustainable management of utilities focused on our sector's historic priorities – providing reliable, affordable, and responsible wastewater collection and treatment service, the most prominent of these is ***Effective Utility Management*** (EUM) (www.WaterEUM.org). EUM is supported by eleven Collaborating Organizations, including all five partners of this Recognition Program. The Ten Attributes of Effectively Managed Utilities and Five Keys to Management Success form the basis for Effective Utility Management. When taken together, these Ten Attributes and Five Keys represent the basis for excellence in utility management. While EUM is not a requirement for recognition under this program, utilities are encouraged to use the EUM framework as they seek to become a Utility of the Future.

The 2016 inaugural ***Utility of the Future Today Recognition Program*** was created to promote actions that build on this foundation of excellent management and help small, medium, and large utilities transform their operations over time. During the initial year, 61 utilities were honored. In 2017, 25 utilities were honored (seven were recognized in 2016 adding a new activity area meeting the criteria). The Utility of the Future Activity Areas focus on the key building blocks to this transformation: recovery and new uses of a full range of resources; and engagement as a leader in the full water cycle and broader social, economic, and environmental sustainability of the community. In addition, transformation of the internal utility culture in support of these innovations, and engagement in the community and formation of partnerships are necessary for success when operating outside of the traditional span of control of the utility.

Program Statement of Purpose

The Utility of the Future Today Recognition Program seeks to reach deeply into the water sector to form and motivate a community of like-minded water utilities engaged in advancing resource efficiency and recovery, developing proactive relationships with stakeholders, and establishing resilient, sustainable, and livable communities. The Recognition Program, through the aggregation and sharing of utility advancements and experiences, enables participants across a broad continuum of capacities and capabilities to learn from each other and continually grow and sustain their efforts to be, and continually advance the concept of, the Utility of the Future.



The Recognition Program seeks to encourage utilities to embed the principles of the Utility of the Future within their organization, beginning with Organizational Culture. Organizational Culture is the foundation by which all other Utility of the Future Activity Areas are sustainably supported.

Utilities receiving recognition through this program are expected to share their practices and experiences to create a community of practice around the Utility of the Future Today, and to enable other utilities to continually learn from each other and evolve as a sector.

105 Utilities of the Future TODAY after three years of program implementation

The following 32 utilities have met the criteria for Utility of the Future Today by meeting the Organizational Culture requirement plus one of the Activities identified on page 6 above. Recognized Activities are indicated by a ★ on their front page of their write-up. Each utility identified in this document has contact information. Utilities receiving recognition through this program are expected to share their practices and experiences to create a community of practice around the Utility of the Future Today, and to enable other utilities to continually learn from each other and evolve as a sector.

Utility Description (combine all plants if a multi-site system)	
Utility Name: **Beckley Sanitary Board**	
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): **Single Plant, Collection, Stormwater**	
Service Area (square miles): **17 square miles**	Average Annual Daily Flow or Demand (MGD): **8 MGD**
Population Served: **Approximately 7,500 Sanitary Sewer Customer Connections. Approximately 10,500 Stormwater Customer Connections**	
Location	
Street Address: **301 S Heber St (P.O. Box 2494)**	

City: **Beckley** State: **WV**		Country: **USA**
Zip Code/Country Code: **25802**		
Utility Representative Contact Information		
Name: **Jeremiah Johnson**	Phone: **304-256-1760**	Email: **jjohnson@beckleysanitaryboard.org**
If this application has been prepared by another entity on behalf of the utility, provide the information of the preparer below		
Name: **Luke Stevens**	Title: **Environmental Specialist**	Contact Information (phone or email): **luke.stevens@beckleysanitaryboard.org**

Organizational Culture

The City of Beckley is planted as a modern economic hub in the historic coalfields and railroad towns of Southern West Virginia's New River Gorge Region. Within this traditionally industrial Appalachian setting, tourism centered on outdoor recreation within the New River Gorge National River is emerging economic growth center. In recognition of the role water infrastructure plays in supporting the community, Beckley Sanitary Board's leadership has created an organizational culture of excellence and innovation, employee empowerment, and community engagement.

Beckley Sanitary Board (BSB) recognizes it has a critical environmental stewardship responsibility as the largest permitted facility upstream of the river. BSB's ongoing commitment to manage pollution and improve water quality is signified by its significant capital improvement program and operational improvements. However, more unique is the expanding role BSB plays in improving overall community environmental stewardship through its establishment and support of local volunteer watershed groups and service of staff on various group boards and service projects.

In a commitment to excellence and to promote a dynamic vision for a clean water future in southern WV, BSB leadership has worked with staff to initiate goals and objectives and promotes a culture of shared responsibility to fulfill those goals as well as celebrating milestones of progress. This culture of shared responsibility has promoted an atmosphere where innovative thinking flourishes as staff understands that their input and fresh perspectives are welcomed as BSB considers how to address long standing issues more effectively. Staff are asked to think of the legacy impact of their day to day decisions on future generations of Beckley residents and businesses. Shared responsibility manifests itself in the ability of staff to grow confident in not only their skills and abilities to recognize a problem, but also more importantly self-prescribe viable solutions for management to consider. This culture manifests itself in more productive and rewarding staff meetings and internal conversations where accomplishments are intentionally celebrated, dovetailed with an energized forward focus to the next goal at hand. The "shared responsibility" approach is also modeled in how BSB is transitioning its communication with public stake holders. Our community members must understand that BSB is stewarding a community resource on their behalf and our success at accomplishing that mission is tied to their ongoing support and investment. So BSB enthusiastically shares exciting milestones reached with our community members, while just as eagerly emphasize that additional progress is needed for the community to achieve its next major endeavor.

BSB's organizational success is linked to the diverse skills and abilities that have been assemble within the staff, which brings a diversity of complementary backgrounds, both academic and professional. This team's cooperative responsibility sharing consistently shows itself well suited to addressing the ever-changing challenges of infrastructure, design, regulation and public relations. Open communication among the team fuels coordinated problem solving efforts throughout BSB, and leverages Sanitary Board's small size to great advantage.

BSB's smaller size also affords it the ability to create a culture of innovation – both in implementing novel approaches and optimizing existing ones. BSB utilizes a fully integrated system of accounting software for managing sanitary sewer and stormwater accounts, customer accounts, and accounts payable. The system is integrated with City of Beckley accounting, operating through a segregation of duties model which ensures balance of fiscal responsibility and open accountability for all funds. These integrated software solutions have enhanced the organization's ability to evaluate its financial position and advance its goal of improving its long-term financial viability. Engineering and mapping staff are fully equipped with drafting and GIS software systems.

In 2017, Beckley Sanitary Board initiated purchase of a computerized management and maintenance software system, which will integrate existing accounting and GIS software systems, and expand and enhance BSB's asset management capabilities. This system adds tremendous potential to improve operational workflows and efficiency within the Beckley Sanitary Board, such as enabling customer concerns to be linked to geographic locations, better pinpointing problem areas, maintaining real-time updates of asset conditions and maintenance records, and budgeting more responsibly for future expenses and risk management.

Innovation has been most visibly displayed in our organization when addressing stormwater management, through bioretention cells and implementation of real time monitoring and adaptive control. Seventeen rain gardens have been installed throughout Beckley, in partnership with local businesses and agencies, including the Boy Scouts of America, who assisted in construction of a WEF service project during 2 National Boy Scout Jamborees. In 2016 and 2017, BSB partnered with OptiRTC to retrofit an existing dry stormwater detention pond with Opti's continuous monitoring and adaptive control (CMAC) system. As a very affordable solution, the retrofit resulted in virtually eliminating flooding in a major flood-prone intersection, decreases to stream bank erosion and resulting sediment load and improving water quality within the subwatershed.

Beckley Sanitary Board embraces the philosophy of employee empowerment. Our employees are our most valuable resource, and investment in our staff and their career development is vitally important to the organization. BSB attempts to empower employees by creating a robust program of employee safety training, ongoing education offered at every employee level, and a quickly growing wellness program in partnership with the city and a regional non-profit.

BSB's safety culture starts upon hire, where each employee is fitted for all personal protective y equipment necessary for his or her respective position. He or she is then scheduled for mandatory safety training, tailored to the position's requirements.

In addition to safety training, BSB employees consistently pursue employer subsidized professional development through continuing education, training, and networking. Employees are encouraged to seek out in-person and online training, conferences, and other networking events, locally, regionally and nationally. BSB intentionally budgets for continuing professional development, covering employees' costs including training fees and travel costs. Not including safety training hours, Beckley Sanitary Board employees completed more than 500 hours of professional development training in 2017.
In 2017, in cooperation with the City of Beckley, Beckley Sanitary Board launched a Workplace Wellness partnership with a local non-profit, Active Southern West Virginia. BSB was among Active SWV's pilot programs, and the Workplace Wellness Program has been fueled by the enthusiasm from Active SWV, and from BSB employees. The partnership has offered opportunities for wellness and health tracker training, participation in community wellness events, and in early 2018, a Winter Step Challenge, in which BSB employees collectively walked over 11 million steps, 89% of participants improved their total weekly steps, and 90% reported they were committing to maintaining their weekly step goal after the competition. This partnership in wellness has not only benefitted BSB employees, but has positioned the Sanitary Board as a local leader in Workplace Wellness initiatives.

Beckley Sanitary Board's organizational culture is further enhanced through our connection within the community. Articulated in our mission statement is a dedication to protecting "local waterways, the environment, and the public we serve." Beckley Sanitary Board embraces our role as a servant of the public, and plays an active part in community endeavors to build goodwill. Through the City of Beckley, BSB is actively partnered with the United Way of Southern West Virginia, through which employees can automatically donate a portion of each paycheck. As of this year, more than 40% of BSB employees are actively donating. At the organizational level, BSB cultivates a strong ongoing partnership with a local watershed association, which engages with the community in areas of clean water awareness and education. BSB employees are intentional community members, investing in community events both at work and at home. Employees are members of local community service clubs and organizations, churches, serve as coaches for school teams, and volunteer within their community. To further emphasize the importance of this aspect of the Sanitary Board's mission, hiring interview questions have recently been adjusted to include questions about volunteer

experience. BSB seeks to recruit individuals who subscribe to a service ethic as our organization is a service based to our customers, community and the local environment.

Partnering and Engagement

As a servant of the City of Beckley, and the local community, and as a regional clean water leader in southern WV, Beckley Sanitary Board recognizes the immense benefit of community engagement, and the virtually limitless potential of what can be accomplished together. To that end, BSB has formed several key ongoing partnerships with the common goal of protecting our water and serving our community.

Since 2004, Beckley Sanitary Board has cultivated a robust partnership with the Piney Creek Watershed Association (PCWA). PCWA is a local non-profit that BSB incorporated and has the mission to "protect(ing) the waters within the Piney Creek watershed by educating the community about water pollution issues and performing service projects." BSB staff have provides hundreds of hours of technical assistance to the organization that has built its capacity to now have a paid staff position. Many of the PCWA service projects are collaborative efforts with BSB. PCWA assisted in the design and construction of two public rain gardens in Beckley, and helped facilitate the involvement of the Boy Scouts of America in the project. PCWA serves as the lead on a continuous collaborative project to install and maintain pet waste stations throughout Beckley. As of 2018, nearly 40 pet waste stations have been installed. PCWA is also a consistent BSB partner in an ongoing stream monitoring project in the Piney Creek Watershed. This project aims to assess the health of the watershed, and help identify sources of pollution.

In 2016, Beckley Sanitary Board launched a new partnership with an innovative water sector startup, Opti RTC (Opti). When BSB was working to address flooding in a high-traffic intersection, Opti collaborated to retrofit an existing stormwater detention pond with their continuous monitoring and adaptive control (CMAC) technology, and install upstream and downstream stream monitoring to enhance understanding of the watershed. Installation of the CMAC system virtually eliminated flooding in the problem area, and subsequent installation of water quality monitors revealed that the retrofit also serves to reduce downstream erosion and remove sediment pollution. Since its completion in early 2017, the retrofitted structure, affectionately dubbed the "iPond," has been visited by City officials and other stakeholders, has served as a destination for student field trips, and is among Opti's most active sites, as it manages the challenges of repeated moderate storms, and a large drainage basin. In recognition of the iPond award, Opti and BSB received the National Environmental Achievement Award from the National Association of Clean Water Agencies (NACWA) in 2018. BSB has used the lessons it learned from the iPond project to educate other water professionals at state training events and national conferences including a planned presentation at WEFTEC2018.

In 2017, upon West Virginia University Institute of Technology's campus move to Beckley, Beckley Sanitary Board initiated partnership conversations with the University. During WVU Tech's first semester in Beckley, BSB hosted a field trip for an environmental engineering course. A life sciences professor and two biology students from WVU Tech have joined in the stream monitoring collaborative between BSB and PCWA mentioned above. Additionally, the Biology Club of WVU Tech connected with BSB and PCWA and completed a storm drain marking project, applying "Drains to Waterways" markers at storm drains along more than 6 miles of Beckley roadways, and across the WVU Tech campus. BSB has also developed an internship position, and filled the position with a WVU Tech Biology student in 2018. BSB hopes to become local sponsor for the creation of a WEF Student Chapter at WVU Tech.

In 2018, through a grant-funded program, BSB will install internet-communicable weather stations at local schools, which transmit local weather data to an online platform. In the web-based platform, students can view and analyze weather data from across the city. BSB will in turn have use this school based weather monitoring platform to enhance its digital watershed to provide a more detailed view of local weather (particularly precipitation data) to assist BSB in operational decision making and public safety.

In its GIS Mapping endeavors, Beckley Sanitary Board partners with other city and county agencies to share costs and collaborate on ideas and best practices. The GIS committee of agencies comprises BSB, the City of Beckley, Raleigh County Assessor, and the Raleigh County EOC.

In addition to the above ongoing partnerships, BSB works in collaboration with the Beckley Public Works Department to coordinate schedules and geographic areas of work. In the fall of 2017, BSB hosted Roadway Safety training and opened the training to the Beckley Public Works.

Throughout the city, Beckley Sanitary Board has initiated and assisted in construction and maintenance of 12 rain gardens. These gardens have often been installed through partnerships with local agencies, including two gardens in which the Boy Scouts of America assisted in construction. Beckley Sanitary Board offers educational tours of our wastewater recovery facility. These tours have included individuals, school groups, and stake holders including board members and members of Piney Creek Watershed Association. BSB also works in conjunction with local business whenever possible, including our local hardware store, and a local company who built and maintains the Beckley Sanitary Board Website. The BSB website offers to the viewer an aesthetic layout through which to navigate to all of BSB's projects and services. The website hosts wastewater and stormwater educational information, customized for individuals, students, teachers, businesses, and contractors. Additionally, BSB maintains an active Facebook page, which displays photographs of recent activity, along with educational material. Since late 2017, BSB Facebook has been posting weekly educational installments.

Question & Answer

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
Generally, implementation of the above activities began with *conversation* with potential or existing partners. The iPond project's inception was a conversation at a WEFTEC Conference, between BSB General Manager and representatives of OptiRTC identifying complementary needs and abilities of the two organizations. The stream monitoring collaborative began with gathering representatives from all partner organizations around the conference room table at BSB, describing the challenge, and listening as everyone began to offer solutions, and define individual roles in the undertaking.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
Most of the activities require BSB staff resources and some limited financial resources. BSB staff are primarily involved in initiating momentum of the project, and facilitating ongoing efforts. We budget our staff's time by minimizing micromanaging and giving ownership of projects to those partnering individuals and organizations who are involved. For instance, when preparing for storm drain marking, BSB staff explained the nature and importance of the project to the WVU Tech Biology Club, and the club handled all the labor. BSB provided training and supplied approximately $200 in materials. The Biology Club took ownership – committing to marking each drain, and even assisting in publicizing the project on social media.
Did you partner with other stakeholders or organizations as a part of your implementation process?
Yes, leveraging partnership with other stakeholders is key to our business model at BSB. While BSB has singlehandedly undertaken many projects, our best efforts have occurred in partnership with others. Ongoing partnership helps an organization recognize and embrace its limitations, while simultaneously overcoming those limitations through cooperative efforts.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
Since all engagement activities require time and energy, the greatest obstacle for BSB to overcome was the *limited resource of staff time and energy*. We have addressed this in two primary ways. First, as a part of the organizational culture, we cultivate among the staff a vision of Beckley Sanitary Board as a servant of the community, encouraging engagement and partnership in that community. This ideology leverages our diversity of staff and their many community connections, so that no one employee is tasked with handling all partnership, but instead, partnership happens as a natural part of the workflow. Secondly, we prioritize partnership with individuals and organizations who can own the endeavor and share responsibility in community engagement. In the implementation of new programs, we and our partners devote extensive energy at the beginning to cast a vision for the effort to be sustainable over time, with strategic segregation of duties. This model allows for programs to continue as part of "daily life" rather than requiring extra attention on an ongoing basis.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
Yes. In the case of the "iPond" retrofit of our stormwater detention facility, OptiRTC's Continuous Monitoring and Adaptive Control (CMAC) technology enables optimization of an existing facility, which prevents flooding and reduces stormwater pollution. Real-time observations through a field-based sensor network and online weather data and

forecasts and changes can be made through an online dashboard. BSB's recent Weather Watch Initiative depends on internet-connected weather stations which enable us to observe and report on real-time weather conditions within our city. Web-based outreach and social media have also served to further BSB's engagement endeavors. Facebook has served as an effective means of connecting to the local online community.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
BSB's primary online presence is our website: http://beckleysanitaryboard.org/
Our educational materials are hosted at: http://beckleysanitaryboard.org/info/education/
Our Facebook page, including our #WaterWednesday campaign can be found at: https://www.facebook.com/BeckleySanitaryBoard/
Beckley Sanitary Board's LinkedIn company profile can be found at: https://www.linkedin.com/company/beckley-sanitary-board/

Performance Measures & Results:

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Establish partnership with WVU Institute of Technology	Establish 2 points of contact for ongoing partnership with WVU Tech in 2017-2018 academic year	Four substantial contacts at WVU Tech have been established, one professor of Engineering, one professor of Biology, one staff member in student career services, and one student intern currently employed with Beckley Sanitary Board. Additionally, BSB has an established connection with the WVU Tech Biology Club, and a student volunteer working with Piney Creek Watershed Association.
Increase number and maintain pet waste stations	Install new waste stations as funds became available and maintain existing stations with new bags	As of 2018, BSB and Piney Creek Watershed Association maintain 27 pet waste stations in the Beckley area. 25 new stations are purchased and being scheduled for installation.
Reduced flooding	Reduce flooding in high traffic intersection via adaptive control system detention facility.	As of May, 2018, flooding in the intersection has been eliminated, including two months of record breaking rainfall for Beckley, WV.
Increase number of weather stations online	Add 3 new weather stations to online dashboard, through partnership with local schools.	As of May, 2018, 3 weather stations have been purchased and will be installed by June, 2018.
Increased Facebook "likes" on BSB Facebook page.	50 new "page likes" in 2018	49 new page likes as of May, 2018.

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Benton Harbor – St. Joseph Joint Wastewater Treatment Plant**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional wastewater treatment facility – single plant		
Service Area (square miles): 50	Average Annual Daily Flow or Demand (MGD): 8.5 MGD, 15.3 MGD Design	
Population Served: 58,000		
Location		
Street Address: 269 Anchors Way		
City: State: St. Joseph Michigan	Country: USA	
Zip Code/Country Code: 49085		
Utility Representative Contact Information		
Name: Timothy J. Lynch	**Phone:** 269-983-7719	**Email:** tlynch@qtm.net

Organizational Culture

The Benton Harbor - St. Joseph Joint Wastewater Treatment Plant is located in southwestern Michigan and is designed to treat 15.3 million gallons of wastewater per day. The Joint Plant employs 18 full-time employees and provides wastewater

treatment services to the Cities of Benton Harbor and St. Joseph, Benton Township and the five governmental units of the Southwest Michigan Regional Sanitary Sewer and Water Authority. The governance of the facility is vested in the Joint Board of Commissioners.

Providing a safe and productive workplace with opportunities for personal and professional growth is a top priority of the plant's governing board and management. Growth, improvement, innovation and advancement are embedded in the organization's culture and are apparent in the following areas:

- Employees / Human Resources
- Facilities / Infrastructure / Finances
- The producing of clean water. This is especially important as the Joint Plant discharges into the St. Joseph River adjacent to Lake Michigan, one of the Great Lakes that comprise 20% of all the fresh water in the world.

The Joint Plant produces and distributes an informational brochure to community members about the facility that includes on its cover the Motto and Mission Statement of the organization. The plant's motto is "producing clean water for the environment". The plant's Mission Statement is: "To protect the local water resources through the development and use of sound operating and fiscal practices in the treatment of municipal wastewater."

Community and stakeholder engagement

Producing clean water and adhering to the Mission Statement is practiced daily in the operation of the Joint Plant's $59 million dollar facility. The Joint Plant serves 58,000 people in southwestern Michigan. Protecting and enhancing the local water resources is critical to the economic viability and quality of life for the communities we serve.

The Joint Plant has hosted an informational event and tour for community leaders to learn about the organization and operational aspects of the facility. The plant manager has also provided presentations to local government and civic groups relating to the Joint Plant and its governing board. In October 2016, the plant hosted and provided an informational tour relating to the water cycle. Approximately sixty engaged citizens affiliated with Michigan's Great Southwest Sustainable Business Forum attended the well-received event.

Employee Health and Safety

Personal health and safety of all employees is of utmost importance. The Board of Commissioners and Joint Plant management promote and maintain an active and aggressive safety campaign and encourages employee involvement through its safety meetings, employee input and continual efforts to improve an already excellent safe work environment. One example of this effort is a monthly walkthrough of the facility by a member of the plant's employee union and plant management. The purpose of the walkthrough is to collaborate, identify and correct any housekeeping or plant conditions that could be detrimental to a safe work environment. Joint Board and management's philosophy is that a neat, orderly facility results in a safe working environment for all employees. This also instills employee pride and a belief that a clean workplace is a safe workplace.

Another activity that has a positive impact upon the safety culture is a morning meeting held each workday prior to assigning job duties. In the meeting, management personnel discuss any potential safety issues identified by a pre-workday walkthrough by senior management. Identified issues are addressed immediately.

The resulting effect is that the Joint Plant has achieved over 5 years without a lost time accident. The last recordable safety incident was over three years ago in January 2015. In recognition of the outstanding safety record, a proclamation of special tribute from the Governor of Michigan and our U.S. Congressman was presented to the plant in 2012. The exemplary health and safety program continues on today.

Effective health and safety practices have also enhanced the plant's fiscal bottom line by reducing workmen's compensation costs and liability insurance premiums. The Joint Plant's workmen's compensation premiums have decreased the past two fiscal years and are approximately only 1% of payroll.

By investing approximately $1.2 million in a 2006 improvement project, the Joint Plant has eliminated pressurized gaseous cylinders of chlorine and sulfur dioxide in the disinfection process, resulting in a much safer environment for the employees and surrounding community. In the past two years, ten employees attended and were trained in "Adult and Pediatric First Aid/CPR/AED" sponsored by the American Red Cross.

The Joint Plant has developed and implemented a Pollution Incident Prevention Plan (PIPP) for the chemicals stored and utilized at the facility. The PIPP outlines procedures to be followed in the event of a chemical release or spill at the plant. A Two-Hour Asbestos Awareness Training Program was also provided to all personnel at the Joint Plant. In addition, Joint Plant employees attended a "Chlorine, Sulfur Dioxide & Sodium Hypochlorite Safety and Handling" workshop.

Safe work practices are encouraged and recognized with the presentation of safety awards each year. For those employees achieving milestone years of accident free work (5, 10, 20 year etc…), a congratulatory letter is written to that employee and presented along with a monetary gift card. Safety isn't an afterthought, it's a significant part of the Joint Plant culture.

The Joint Plant was recognized as the 2018 recipient of the George W. Burke Award by the Michigan Water Environment Association (MWEA). This award recognizes a municipal wastewater facility for establishing and maintaining an effective safety program. In summary, the Board, management and employees of the Benton Harbor – St. Joseph Wastewater Treatment Plant are proud of our health and safety program and its history and we all hope to continue this trend for many years to come.

Employee Training and Personal Development Efforts

In-house training is provided to employees to assist in their preparation for license certification exams. Internal policies also allow for tuition assistance to defray the costs of training and certification exams. Leave time is also made available for employees to pursue outside training sponsored by Michigan Water Environment Association (MWEA), Michigan Department of Environmental Quality (MDEQ) and other professional training organizations. Such training has proven beneficial to employees in certification and advancement of their licensure levels.

To date, thirteen out of eighteen employees have achieved varying levels of Michigan Department of Environmental Quality (MDEQ) wastewater operator licensing. Five employees have achieved their initial licensing level in the past two years. Four employees have achieved California Water Environment Association (CWEA) certifications in areas of laboratory, maintenance and biosolids management.

Employees are recognized and rewarded for achieving licensure in their respective classifications. Advanced licensure is incentivized and additional pay is provided to those who achieve advanced licensing levels. To sustain the future of our profession, the Joint Plant has also employed student interns attending post high school institutions to pursue a career in the water environment field.

Employee Recognition

The Joint Board and plant management understand and appreciate the efforts of all employees who contribute to the Joint Plant's successes. Employees are appreciated and their worth to the organization is valued not only when employed but also after retirement. Each summer, employees are recognized at employee appreciation luncheon / cookouts. Plant management prepares and provides the food and the Board Chairman is also in attendance to thank the employees for their service. Frequently, several retirees will participate as well.

Each December, employees and retirees are recognized and appreciated at a holiday luncheon provided by the Board and plant management. The event provides an opportunity for all to reflect and celebrate the Joint Plant's many decades of successful operation.

Strategic Capital Planning

The Joint Board has acquired a reputation as being progressive, diligent and cost-conscious in its affairs. Since 1986, the Joint Plant has invested approximately $35 million dollars in the facility. The Joint Board has adopted a "pay as you go" approach and pays for improvements with reserve funds set aside for capital improvements.

In 2004, The Joint Plant developed and implemented a Strategic Capital Improvement Plan (SCIP). The SCIP was coordinated in timing with the mentoring and promotion of the current plant manager. The objective of the SCIP was to identify, prioritize and provide cost information relating to recommended improvements and renovations necessary to meet facility treatment capacity and reliability requirements over a 12-year planning period. Several identified projects were planned and completed between 2005 and 2015.

In 2015, the Joint Plant updated the SCIP and currently $25 million in projects are slated through Year 2027. Approximately $22 million has been invested in the last 12 years. On average, approximately 30% of the Joint Plant's revenues are re-invested in capital improvements. The Joint Plant manages its own investments. This has resulted in no borrowed money and the organization has been able to earn $72,000 on average per year in interest over the past 5 years.

Since 2010, capital improvements have consisted of the construction of a new influent pump station along with significant electrical upgrades, the installation of new dual fuel boilers to better utilize the biogas produced in the plant's anaerobic digestion process, the installation of a new turbo-blower with SCADA controls, and the construction and installation of a new headworks facility to provided optimal grit removal and screening for the plant's influent wastewater. Several other smaller improvement projects have been completed since 2010 as well.

Investing in newer technologies, the Joint Plant has been able to keep maintenance costs in check with increases in expenses being less than the CPI rate of inflation for the past 20 years. The Joint Plant was recently recognized as the recipient of the 2018 Sustainable Energy in a Large Facility Award by the MWEA.

Treated Effluent Quality

As noted earlier, producing clean water for the environment is the Joint Plant's motto. This is most evident in the plant's treated water quality. Over the past five years, removal rates were excellent averaging 97% for BOD, 97% for Suspended Solids and 85% for Phosphorus on average over the period. These rates translate into effluent concentrations of 6.5 mg/l of BOD, 7.8 mg/l of Suspended Solids and 0.64 mg/l of Phosphorus – well below the plant's NPDES permit limits of 25 mg/l for BOD, 30 mg/l for Suspended Solids, and 1.0 mg/l for Phosphorus.

Summary

The organizational culture of the Benton Harbor - St. Joseph Wastewater Treatment Plant is one that is continually evolving and hopefully, improving. The Joint Board and management strive to operate and maintain the facility safely and efficiently on a perpetual basis with the long term goal of preparing the Joint Plant to prosper and succeed for many decades into the future.

Energy Generation and Recovery

The Benton Harbor – St. Joseph Joint Wastewater Treatment Plant was constructed and placed in operation in 1952. In 1970, a major expansion was completed that increased the treatment capacity to 13.5 MGD. The current design capacity is 15.3 MGD. The Joint Plant employs the activated sludge process with anaerobic digestion and land application of the plant's biosolids. From the plant's inception, energy generation and recovery due to the availability of the biogas produced in the anaerobic digestion process has been a critical feature in the facility's reliability and sustainability going forward.

Implementing a "pay as you go" financing approach, the Joint Plant has invested approximately $20 million of reserve funds in improvements over the past 10 years and $35 million over 30 years. The current Strategic Capital Improvement Plan (SCIP) has $25 million in projects slated over the next 12 years. Capital improvements have been ongoing since 1986, including many that focus on energy savings as well as energy generation and recovery. In 1994, a $1.1 million dollar improvement project included the installation of two 240 HP gas engines intended to be fueled primarily by biogas. In 2008, a $10 million upgrade included major rehabilitation of the plant's anaerobic digesters, leading to improved production of the plant's biogas.

Since 1994, the biogas produced has been utilized to fuel the two gas engines that drive the plant's main wastewater pumps. Prior to that, older biogas fueled engines were used to drive pumps and compressors for influent pumping and the activated sludge process, respectively. Throughout the history of the plant, cooling water from the plant's final

effluent and heated water from the engine's jacket water system have been recovered and reused in the plant's heating and cooling systems.

In 2013, dual fuel boilers were installed, leading to even greater beneficial use of the biogas in heating the plant's digesters and buildings. Prior to the Dual Fuel Boiler Project, a study was performed to evaluate the viability of new boilers and to assess installing an additional heat recovery system for the engine exhaust system. Though the engine jacket water heat was already being recovered, an engine exhaust heat recovery system was considered as well. Upon analysis it was determined the payback for such a system would be 12 years. This did not seem to be a logical project due to the age of the gas engines. Therefore, that energy recovery project was not pursued but the Joint Plant did go forward with the installation of the dual fuel biogas boilers.

Currently, the Joint Plant is partnering with the U.S. Department of Energy Midwest Technical Assistance Partnership in a program for evaluating potential Combined Heat and Power (CHP) projects. The program for our area is administered by the University of Illinois at Chicago. The goal is to evaluate the Joint Plant's biogas system and gas engines to determine a plan going forward to replace the engines with CHP equipment and explore the potential of adding more boiler equipment.

The Joint Plant has a long history of being a progressive and well run facility that produces clean water and manages a program for the beneficial reuse of biosolids. The plant also employs systems and processes that produce energy and recover heating and cooling components from those processes. In addition, the Joint Plant maintains an effective and proven capital improvement program. All of these factors go hand in hand in leading to the successful operation of the facility.

Energy monitoring and management is an important part of the Joint Plant operations. Internal policies and practices dictate the recording of utility consumption data on a daily basis. The daily data is collected and utilized in monthly and annual reports and shared with key stakeholders. Efforts to maximize energy savings and energy recovery measures are greatly emphasized and included in capital planning when appropriate. Trends are noted and action is taken to minimize the impact of energy usage along with methods to capture and reuse energy produced in the plant's daily operations.

In addition to producing clean water for the environment, the Benton Harbor - St. Joseph Joint Wastewater Plant engages in several energy generation and recovery efforts that not only enhance the operational bottom line of the facility but also increases the plant's resiliency and sustainability going into the future.

Question & Answer: Respond to the questions listed below in as much detail as possible to provide a guide to other utilities seeking to learn from your experiences and implement similar activities/practices at their system.

1. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

Planning and funding for capital projects has been an integral part of the Joint Plant's management strategy since the early 1980's when the 1970 construction bond debt was paid in full. Capital needs were identified and the Joint Board and management decided to adopt a "pay as you go" funding mechanism for financing future projects. The rate structure was set up to accumulate revenues for a capital project fund. A capital improvement plan was developed and updated from 1985 through 2004. Since 1986, approximately $35 million has been invested in capital projects at the Joint Plant. Several projects over the years have been focused on energy generation and recovery.

In 2004, in conjunction with a transition to a new plant manager, proposals were sought from engineering firms to develop a Strategic Capital Improvement Plan (SCIP). The SCIP was developed for a 12-year planning period through 2016. In 2015, that plan was updated and the Joint Plant now has a strategic capital plan covering the period through Year 2027 and includes $25 million dollars in projects. Planning for energy generation and recovery utilizing the plant's biogas and other thermal processes is a significant portion of that plan into the future.

2. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

In order to pursue such an aggressive capital plan on an annual basis, the Joint Plant employs a full time facility engineer to act as the Owner's representative on all construction projects. That individual is responsible for planning, scheduling and executing the smaller in-house projects as well.

Financing for capital improvements is also necessary. When preparing annual budgets, the Joint Plant forecasts to generate revenues in excess of expenses at an acceptable and approved rate to provide for a capital improvement fund. Currently, the Joint Plant generates revenues that are approximately one-plus million dollars per year in excess of expenses to provide financing for that capital reserve fund.

3. Did you partner with other stakeholders or organizations as a part of your implementation process?

The Joint Plant retained a public relations firm to initially inform stakeholders of the need to adjust treatment rates with the goal of improving and making the facility sustainable. Engineering firms have been retained as well to perform studies and assessments to justify the capital needs of the organization. Currently, the Joint Plant is working with the U.S. Department of Energy Midwest Technical Assistance Partnership in a program for evaluating potential Combined Heat and Power (CHP) projects. The program for our area is administered by the University of Illinois at Chicago.

4. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

The most critical obstacle in achieving energy generation and recovery initiatives has been the securing of funding for the capital needs. Anaerobic digestion equipment is very capital intensive. The Joint Plant has been successful in overcoming the financial hurdles by being informative and transparent in the organization's needs for the projects. A five year financial plan and ten year capital plan is included in each fiscal year budget. The five year financial plan includes smaller incremental rate adjustments that coincide with the plant's capital needs. This approach has seemed to work well.

5. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

SCADA systems have been implemented on a gradual basis into the plant's operating systems and technology that allows for natural gas fuel to supplement biogas on certain occasions has been installed. The current CHP evaluation process with the Department of Energy will explore the potential of installing state of art the biogas monitoring equipment.

6. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

Contact the Plant Manager Timothy Lynch at 269-983-7719 or tlynch@qtm.net. Information regarding the U.S. Department of Energy Midwest Technical Assistance Partnership can be found at www.midwestCHPTAP.org.

7. Performance Measures & Results: Using the table below, please describe the measures that you use to gauge performance in this Activity Area, including the targets that you set for each measure and your actual outcomes to date. For your reference, a list of example measures for each Activity Area is included in **Appendix 2**.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Energy saved by running gas engines on biogas	To reduce/minimize electrical and natural gas costs	Since 1994, approximately $50,000 per year has been saved in electric usage and over $30,000 per year in natural gas.
Natural gas consumption reduced by running biogas boilers instead of all natural gas boilers.	To significantly reduce natural gas boiler heating costs.	For the 5 years prior to installing the biogas boilers, natural gas usage averaged 19,283 mcf per year. For the 5 years since the biogas boilers were installed, natural gas usage has averaged 8,486 mcf per year – a 56% reduction.
The feasibility of installing engine exhaust heat recovery	To increase heat recovery from the gas engines and reduce	Annual cost savings would be $24,000 per year. The capital cost to install the equipment would

equipment on the existing gas engines.	heating costs for digester heat and building heat.	be $300,000. A 12 year payback. This option was not pursued due to the lengthy payback and the age of the existing engines.

Utility Description (combine all plants if a multi-site system)	
Utility Name: **Carroll County Water Resource Coordination Council or WRCC** *Comprised of the following utilities:* Carroll County Department of Land & Resource Management and Department of Public Works Town of Hampstead Town of Manchester Town of Mount Airy Town of New Windsor Town of Sykesville City of Taneytown Town of Union Bridge City of Westminster	
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): 9 separate public water treatment and distribution systems, public wastewater collection and treatment systems, and stormwater infrastructure systems	
Service Area (square miles): 453 sq mi total combined	Average Annual Daily Flow or Demand (MGD): All 9 systems combined totals: Water AADD = ~7,079 MGD Wastewater = ~9,240 MGD
Population Served: ~174,247 (all jurisdictions total)	

Carroll County – 122, 887 Town of Hampstead – 6,425 Town of Manchester – 5,416 Town of Mount Airy – 6,016 (in Carroll County)	Town of New Windsor – 1,489 Town of Sykesville – 4,811 City of Taneytown – 7,122 Town of Union Bridge – 977 City of Westminster – 19.104

Location		
Street Address: Carroll County Land & Resource Management, 225 North Center St, Suite 204		
City: State: Westminster, MD		Country: USA
Zip Code/Country Code: 21157		
Utility Representative Contact Information		
Name: Brenda Dinne	Phone: 410-386-2140	Email: bdinne@ccg.carr.org

Organizational Culture

Carroll County is a rural/suburban county located northwest of Baltimore, Maryland, with its northern boundary sharing a border with Pennsylvania. The county is 453 square miles, or roughly 289,920 acres. Agriculture is the county's primary economic driver in the unincorporated area. Eight incorporated and autonomous municipalities reside within Carroll's borders – Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, Taneytown, Union Bridge, and Westminster. All but Sykesville also own and operate their own water systems. All but Sykesville and Hampstead own and operate their own wastewater systems. The County provides public water and sewer service to Sykesville through the systems that serve the Freedom area. The County owns and operates the sewer system that serves Hampstead. Each jurisdiction also owns and operates its own stormwater infrastructure and system.

Carroll County and its municipalities have a long history of an organizational culture that fosters a spirit of cooperation and collaboration between the nine jurisdictions. This cooperative spirit has endured through the decades, even as elected officials have come and gone. Below are some of the activities, programs, and policies that demonstrate this rich tradition of fostering coordination, cooperation, and partnership.

- The adoption of the County's first comprehensive master plan in 1964 cemented this culture of coordination and collaboration between Carroll County and its municipalities. The municipalities agreed that the majority of new growth and development should occur in and around the municipalities where there was existing development and available infrastructure. The Master Plan established designated growth areas, which were centered on the municipalities, and set an agricultural land preservation goal for the unincorporated areas.
- Since 1978, the Board of County Commissioners and each municipality have annually entered into an agreement ("Town/County Agreements") to share funds and coordinate planning and other governmental functions.
  - Funds passed to the municipalities from the County help to offset the cost to the municipalities of focusing new growth in those areas.
  - The County provides a liaison to each municipality to assist with planning and coordination between the County and municipalities.
  - The County often works with individual municipalities to develop joint comprehensive plans to ensure coordination and agreement on growth and its facilities and services impacts to both jurisdictions.
  - Each jurisdiction cooperatively refers to the other jurisdictions for review of subdivision plans, master plans, master plan amendments, annexation petitions, and rezoning petitions.
  - Coordinated, efficient implementation of regulations and protection measures take place under a cooperative environment. In most cases, the County provides staff and other resources to manage, implement, and enforce measures needed to ensure compliance with applicable regulations and protection measures.
- The Water and Sewer Master Plan acts as an implementing tool to each jurisdiction's comprehensive plan. The County develops and updates one joint plan in coordination with and on behalf of all of the municipalities. The first

Water and Sewer Master Plan for Carroll County was completed in 1964. This plan continues to be updated on a triennial basis, with interim amendments completed as needed.

- To foster integrated and collaborative solutions to common water resource challenges, the County, municipalities, and County Health Department agreed to form a joint partnership to provide a forum for discussion of ideas, solutions, policies, and cost saving approaches to water resource development and protection. The Carroll County **Water Resource Coordination Council** (WRCC) was formed in 2007 and serves as the lead intergovernmental agency for water resource planning, development, and protection in Carroll County.

Partnering & Engagement

In the early 2000s, as a result of droughts, State water supply appropriation issues, new National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permits, and the impending Chesapeake Bay Total Maximum Daily Loads (TMDLs), the County and municipalities were facing major challenges with water supply development, stormwater runoff, and wastewater discharge caps that impacted opportunities for growth and development. To foster integrated and collaborative solutions to these challenges, the County, municipalities, and Health Department agreed to form a joint partnership to provide a forum for discussion of ideas, solutions, policies, and cost saving approaches to water resource development and protection. The Carroll County **Water Resource Coordination Council** (WRCC) was formed in 2007 to serve as the lead intergovernmental agency for water resource planning, development, and protection in Carroll County. The County provides staff support to the WRCC.

- **Water Resources Planning**: Carroll County and its municipalities worked collaboratively to develop and adopt one unified planning document – the Water Resources Element – to ensure that future County and municipal comprehensive plans reflect the opportunities and limitations presented by local and regional water resources, including water supply, wastewater, and stormwater.
- **Local Watershed Implementation Plan (WIP) Team:** The WRCC acts as the *local* Chesapeake Bay Total Maximum Daily Load (TMDL) WIP team, providing consensus guidance on issues related to development and implementation of local measures to assist the State in reducing nutrients to achieve the Bay nutrient TMDLs.
- **MS4 Co-Permittees**: In December 2014, the County and municipalities became co-permittees on the County's NPDES Phase I MS4 permit.
- **MS4 Compliance**: In coordination with each municipality, the County identifies, bids, designs, and constructs all municipal stormwater retrofit facilities installed for MS4 compliance.
- **MS4 Capital Cost-Sharing**: The County funds 80% of the capital costs for municipal MS4 compliance projects.
- **Jointly Funded Positions**: The County and municipalities jointly fund positions to support MS4 compliance.
- **Monthly Meetings**: The WRCC meets monthly to discuss and address water resource management issues of mutual interest. Meetings are open to the public, and agendas are available online.
- **Joint Public Outreach**: The County and municipalities engage in joint public outreach efforts for water conservation and stormwater management.
- **Emerging Water Resource Issues**: The WRCC proactively identifies emerging water resource issues and discusses their impacts and possible measures to address them.
- **Joint MS4 Training**: Joint stormwater management training sessions are held annually for County and municipal staff.
- **Joint Public Workshops**: The WRCC and the Carroll County Environmental Advisory Council jointly sponsor public workshops targeted to businesses and/or homeowners to educate on best practices to minimize and mitigate stormwater runoff and conserve water.
- **Grant Funding for Joint Projects**: The County's grant specialist secures grants to offset capital costs associated with stormwater infrastructure for WRCC members.
- **Collaboration on Public Groundwater Supply**: County hydrogeologists identify potential groundwater sources for public water supply for the municipalities, assist in permitting applications, and monitor groundwater levels in public water supply wells. Potential future joint water sources to supply multiple municipalities have been identified.

Question & Answer

a. *How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?*

- **Water Resources Planning**: Carroll County funded and managed a consultant to provide a water balance and wastewater limitations analysis. Discussions, results, and direction were vetted through the WRCC and a joint plan drafted. The elected officials from all jurisdictions held a joint public hearing, and subsequently each signed a resolution to adopt the Water Resources Element of the comprehensive plan.
- **Local WIP Team**: The WRCC keeps abreast of Bay restoration activities and requirements, directs staff actions, and approves official submittals.
- **Co-Permittees on MS4 Permit & Shared Funding:**
  - **Memorandum of Intent**: In April 2014, the Board of County Commissioners and the Mayors of all eight municipalities signed a Memorandum of Intent (MOI) for joint participation in addressing NPDES MS4 requirements. The MOI indicated the County's and municipalities' intent to become co-permittees on the County's NPDES Phase I MS4 Permit, as well as to cost-share stormwater mitigation projects.
  - **Memorandum of Agreement**: Following the MOI, the WRCC drafted a Memorandum of Agreement (MOA) to address how this cost-share would take place and to delegate the administrative responsibilities of the Permit. On October 2014, the Board and the Mayors officially signed the MOA.
  - **Shared Funding**: Shared funding is accomplished through a combination of the MOA and the Town/County Agreements. Each municipality contributes a portion of the salaries for the NPDES Compliance Specialist positions. The County pays 80% of capital costs for municipal impervious surface restoration projects. Other cost-sharing and services/staff support are provided are spelled out in the agreements.

b. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

No additional resources were needed to form the WRCC and provide a forum for regular meetings and coordination. Staff incorporated these activities into their existing workload. The compliance costs for the impervious surface restoration requirements of the joint permit are not necessarily greater than they would have been with separate permits. On the contrary, the joint permitting arrangement reduced the overall costs for all 9 jurisdictions. Approximately 23 County Land & Resource Management employees are involved in the watershed restoration initiatives, including the two positions created to support compliance work with the municipalities. County Public Works staff devotes time as well.

c. Did you partner with other stakeholders or organizations as a part of your implementation process?

The WRCC's purpose is to foster, between the County, municipalities, and Health Department, integrated and collaborative solutions to water resource challenges through this joint partnership. Additional coordination occurs as needed with State officials, local consultants, businesses, and experts.

d. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

The most critical obstacle was getting initial buy-in from elected officials on the importance of funding and benefit of coordination. Given the established working relationship, committing to coordinate was a natural transition compared to funding commitment. Securing buy-in on the MOA to be co-permittees on the MS4 permit required excellent communication by the WRCC members with each other, with their elected officials, and with their attorneys.

e. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

While smart information technology, such as smart meters, has been incorporated into the operation of the systems, it has not been a significant component of the partnership and engagement process that has made the WRCC a successful venture.

f. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

The County hosts a webpage for the WRCC at http://ccgovernment.carr.org/ccg/lrm/wrcc/. For more detailed information, contact Brenda Dinne, Special Projects Coordinator and one of the support staff to the WRCC, at bdinne@ccg.carr.org or 410-386-2140.

Performance Measures & Results

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Aggregate impervious surface totals to remove jurisdictional boundaries for treatment.	Combine impervious surface of all jurisdictions to provide more cost-efficient and effective stormwater management.	State issued permit on December 29, 2014, with County and municipalities as co-permittees.
Complete installation of 100% of projects needed in all 9 jurisdictions to comply with impervious surface restoration requirements in MS4 permit.	Compliance with NPDES MS4 permitting requirements	All projects were identified and funding programmed. During this permit term, as of end FY17, 1,369 acres of impervious area were restored, or 85% of the required goal of 1,614 acres – on track to meet the 20% restoration requirement by December 2019.
Budget 100% of funds needed to comply with impervious area restoration requirements in MS4 permit.	Compliance with NPDES MS4 permitting requirements	All projects for compliance by all 9 jurisdictions have been identified and funded.
Provide at least one annual joint training opportunity.	Compliance with NPDES MS4 permitting requirements	Annual joint training for all applicable County and municipal staff is held in November.
Identify and implement additional public outreach initiatives for water quality and quantity	Compliance with NPDES MS4 permitting requirements	Additional public outreach measures were added during this permit term, including a PSA video, BMP brochures for businesses and homeowners, website resources, and additional events and workshops.
Add another jointly funded NPDES Compliance Specialist position.	Compliance with NPDES MS4 permitting requirements and provide adequate staff services	A second NPDES Compliance Specialist position was funded and hired following the signing of the MOA and issuance of the joint permit.
Offset costs as much as possible through grant funding.	Offset costs as much as possible through grant funding.	The County has secured over $5.2M in grants from outside sources for capital outlays for projects for all 9 jurisdictions.

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Charlotte Water**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): 5 Wastewater Plants (123MGD), 3 Water Plants (242 MGD), 90,000 WT of biosolids produced, 4200miles each water and sewer lines, 77 lift stations, 70 Significant Industrial Users, approximately 6000 permitted Food Service Establishments. Charlotte Water is an Enterprise Fund Department of the City of Charlotte.		
Service Area (square miles): **530**		Average Annual Daily Flow or Demand (MGD): **80.0 MGD**
Population Served: **~ 1,000,000**		
Location		
Street Address: **4222 Westmont Drive**		
City: **Charlotte**	State: **North Carolina**	Country: **United States**
Zip Code/Country Code: **28217**		
Utility Representative Contact Information		
Name: **Angela C. Lee**	Phone: **704-336-5911**	Email: **alee@ci.charlotte.nc.us**
Current Program Members Only **Fill in this section only if the utility has been recognized as a Utility of the Future Today in prior years**		
In what year did the utility achieve recognition as a Utility of the Future Today? 2016		

In which Activity Area(s) has the utility been recognized previously? Include all Activity Areas for which the utility received recognition in 2016 and/or 2017.

x_ Activity Area 1: Beneficial Biosolids Use
x_ Activity Area 2: Partnering & Engagement[1]
x_ Activity Area 3: Energy Efficiency
__ Activity Area 4: Energy Generation & Recovery
__ Activity Area 5: Nutrient Reduction & Materials Recovery[2]
__ Activity Area 6: Water Reuse
__ Activity Area 7: Watershed Stewardship[3] (__IGP)

Energy Generation & Recovery

Overview Paragraph: Charlotte Water installed the first municipal combined heat and power (CHP) cogeneration system in North Carolina at the 64 MGD McAlpine Creek Wastewater Management Facility. This innovative project uses biogas from the anaerobic digestion process to fuel a 1 mega-watt engine to create electrical power, offsetting the plant's demand by up to 34 percent—while also creating a sustainable heat source.

Question & Answer: Respond to the questions listed below in as much detail as possible to provide a guide to other utilities seeking to learn from your experiences and implement similar activities/practices at their system.

a. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph? Discussions began with Duke Energy in late 2008 to explore options for energy minimization and potential beneficial use of biogas. Basically Charlotte Water (CW) was flaring almost 900lbs of gas/day via two flares on site. Charlotte Water representatives explored alternative energy options as part of an energy and biofuels learning trip to Austria. As a result of that trip and discussions with Duke Energy, CW commissioned a study with the North Carolina Solar Center at NC State University to explore the potential for utilizing this biogas for power generation. The study concluded that the McAlpine gas was adequate, of high quality and could provide a significant power generation. A second study was commissioned in partnership with the NC State Solar Center and CDM Smith to evaluate various technologies for converting the gas to power and potential financial options. During the second study Charlotte Water Operations staff made visits to similar installations at a landfill and a non-municipal site. A financial strategy attorney, Larry Ostema and Southeastern Engineering were third parties utilized to give CW specific direction financing options and specific negotiations with Duke Energy.

b. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other) CW was able to secure an engine that has been manufactured for another municipality that had cancelled their order saving over 10 percent of the project cost. CW sought North Carolina State Revolving Green funds to finance the project and was able to secure $4.6million at zero percent interest. Participants in the design and construction were CW engineering and operations staff, consulting engineers who provided ongoing project management and critical design phase services and construction administration for the electrical system design and the high voltage electrical transmission system.

c. Did you partner with other stakeholders or organizations as a part of your implementation process? CW partnered with Duke Energy on a Power Purchase Agreement. The State of NC provided 0% interest loan. NC State University for two studies - an initial feasibility study and a follow up study to evaluate various technology options.

d. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that? CHP acceptance was difficult because power costs are low in NC at 5.5 cents per Kwh. CW had to make a business case to show the benefit with a longer payback of 10

years. CW was able to purchase the equipment at a discounted rate which made the difference in cost of the overall project and payback. Duke Energy had very stringent requirements on how the Power Purchase Agreement (PPA) had to be structured.

e. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe. CW implemented a sophisticated control system for the CHP to monitor all components including gas utilization, power generation and maintenance needs.

f. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented? Talking with and physically visiting other utilities and learning from them about their experiences provided valuable insight into lessons learned. The Department of Energy and the local electrical power companies are good resources. In addition, WEF offer materials such as the Energy Road Map that can provide guidance related to implementing one of these projects.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Plant power requirements	Produce 15% of needed power	Offset facility power consumption by up to 34%

Energy Generation & Recovery

1. Energy Input: 9,298 MBH (2724 kW) – Biogas
2. Electrical Energy Output: 1059 kW (3,410 MBH) – 36.7% Electrical Efficiency
3. Recovered Thermal Energy (Water Jacket, Oil Cooler, 1st Stage Intercooler) – 2,366 MBH (694 kW) – 25.5% Thermal Efficiency
4. Recovered Thermal Energy (Exhaust) – 2,168 MBH (635 kW) – 23.3% Thermal Efficiency
5. Total Recoverable Energy from CHP: 85.5%
6. Electricity Generated @ 480VAC, Stepped up to 24 kV
7. This project was the 1st place recipient of the ACEC
8. As of 4/3/2018 revenue total over about 1 year is $234,265.70.

Utility Description		
Utility Name: **City of Detroit Water and Sewerage Department**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Collection and Distribution System Only		
Service Area (square miles): 139	Average Annual Daily Flow or Demand (MGD): 190 MGD	
Population Served: 677,000		
Location		
Street Address: 735 Randolph St		
City: Detroit State: MI	Country: USA	
Zip Code/Country Code: 48206		
Utility Representative Contact Information		
Name: Dan Rainey	Phone: 313-999-4133	Email: Dan.Rainey@Detroitmi.gov

Organizational Culture

For over nearly 185 years, the Detroit Water and Sewerage Department (DWSD) served as the local water department to the City of Detroit and provided regional water and sewage treatment services to its surrounding communities, eventually providing services to over 40% of the state of Michigan's population (treated water to 126 suburban

communities and sewage treatment to 84 communities) In 2016, DWSD was split into two organizations as part of the City of Detroit's bankruptcy settlement; one organization, The Great Lakes Water Authority, was established to manage the wholesale water and sewage infrastructure and services, while DWSD was reconfigured to a collection and distribution system servicing just the City of Detroit. With this change, DWSD went from being a $1 billion dollar a year organization serving both the region and the City, to one focused only on delivering distribution and collection services to the City of Detroit.

This change presented an opportunity to establish a new organizational culture, one based on service excellence, where all DWSD employees strive to improve the lives of Detroit's citizens by making water services as accessible and affordable as possible and by delivering every customer experience with PRIDE (Personal Responsibility In Delivering Excellence).

DWSD's vision is to be recognized for its operational excellence, its exceptional and compassionate customer service, and for being an "anchor institution" within the City.

To make this new culture and vision a reality, DWSD adopted a strategic planning process that cascades the alignment of the department's goals using a One Page Plan. Each of DWSD's department's One Page Plan supports the overall departmental One Page Plan and each of the One Page Plans consist of three to five SMART Goals each. This planning process enables DWSD to measure its outcomes against its goals in a way that is transparent, easy to understand and that provides a platform for meaningful dialogue on what is really important.

Using the One Page Planning approach to strategic and operational alignment DWSD has:

- Implemented a Capital Improvement Management Office committed to delivering $400 million worth of infrastructure projects in the next five years.
- Implemented an Asset Management Program, providing a platform for actively managing the utility's new and existing linear and fixed assets.
- Limited revenue requirement increases to 2% over the last two years, limiting or, in some cases, eliminating rate increases.
- Launched an extensive green infrastructure program in the City that will help establish Detroit as "the greenest city in America", by managing enough storm water runoff to eliminate the need for additional CSO investment.
- Developed and successfully implemented a pilot program to find job opportunities for "returning citizens" with DWSD specifically.
- Invested in local billboards, media and social media spots to encourage Detroiters not to let their water get shut off.
- Developed "DETROIT Water WORKS!" as new branding message.
- Partnered with local training providers to provide Detroiters with the skills to gain employment with DWSD or local construction contractors.
- Encouraged contractors, especially construction contractors, to hire Detroiters when contracting with DWSD.
- Provided training opportunities to all employees.
- Supported the City of Detroit's LEAN/Six Sigma program by enrolling no less than four teams annually, resulting in measurable improvements in operations (shortening water main replacement times by 8 hrs. for example).
- Adopted a "Cloud First" approach for its Information Technology operation, resulting in improved system performance, cost and availability.

Partnering & Engagement

With the refocused effort at DWSD came many challenges including, most importantly, repairing the relationship DWSD has with its local customers. For many years, DWSD treated its retail customers in a way that discouraged direct engagement. There were long lines at the customer service centers, phones that rang with no one to answer, bills that were difficult to read and customer service representatives that really did not understand what type of assistance they could and could not provide. This type of treatment resulted in DWSD being viewed as an organization that did not care about its customers. To rectify this image issue, the new Executive Team focused its immediate efforts on establishing DWSD as a customer focused, anchor institution.

DWSD focused first on improving its direct contact with its customers by assembling several unique services into a concise customer service delivery system, titled "Skip The Line". DWSD was faced with long lines at its customer service centers, lines that regularly made local and regional newscasts. To address this, the team, developed several strategies for taking folks out of the line if they did not absolutely need to be there, including an appointment setting system that allows customers to schedule an appointment for today, tomorrow or even next week; a city-wide network of over 50 payment kiosks connected live to DWSD's billing system, providing immediate relief from scheduled service interruptions with a minimum payment using cash, check or credit card; and a new mobile-optimized customer service portal that provides a platform for entering into a new payment agreement (which is a primary cause for the very long lines). This comprehensive set of services provides real options to DWSD's citizens (and community partners who help by providing citizens access to these tools if needed) to avoid water service interruptions.

Establishing itself as a community-based organization, DWSD holds regular meetings, hosted with community stakeholders, including four community board meetings annually, several neighborhood and area workshops on DWSD's new drainage program, participating in City Council Community meetings and attending Mayoral town halls and workshops. DWSD has assembled a Customer Assurance Specialist Team or C.A.S.T., that comes prepared to all public meetings to address any DWSD customer concerns. Overall, DWSD staff are on the road a minimum of twice a month.

A healthy social media presence is important to DWSD and as such DWSD has established several accounts including Facebook, Instagram, Twitter and YouTube Accounts. DWSD is extremely active on Twitter and Facebook, engaging customers, employees and recruits.

Establishing itself as a community anchor institution, DWSD partnered with the City of Detroit Public School's Randolph Career Technical Center, a local workforce training center in Detroit, from where DWSD is committing to hire qualified graduates for DWSD positions as the community is able to provide qualified candidates.

Continuing to illustrate its commitment to the City's residents and establish itself as an anchor institution, DWSD is making up to $400 million in infrastructure investments in the City during the next five years. DWSD is encouraging its contractors to partner with local workforce development operations and to recruit locally so that the as local opportunities open in the construction industry, especially relative to DWSD's expanded capital plan, qualified residents can find employment replacing Detroit's water and sewer services.

DWSD has implemented what is arguably the most comprehensive, and compassionate, customer assistance program by a local water utility. Eligible DWSD customers can qualify for up to $1,000 in aid per household per year, a home water audit, home repairs up to $1,000 and supporting wrap-around services. DWSD is also piloting installing low-flow toilets in 500 eligible customers' homes, and if the pilot proves to be successful is committed to replacing up to 5,000 old 5-gallon toilets with new low-flow models.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
DWSD addressed what it saw as the root issues by prioritizing on what were most the important obstacles and creating a culture that allows the development of sustainable solutions, versus one-time fixes. This more strategic approach means that DWSD does not have to go back and fix issues again that were "already fixed" and can make investments in way that is affordable and sustainable. Projects had to be managed in a way that provided the controls necessary for successful project implementations but also with enough flexibility to forgo all the gates typically found in a Project Management Methodology when necessary and if the risks could be managed. For example, DWSD adopted a combination of Agile and a Waterfall methodology when creating the Customer Portal that allowed the development teams on one side move differently than another team. Adopting a people change management process that includes explaining to employees why changes are being made, what their new roles are in the changed environment and then providing the gap analysis and employee training necessary to allow success is also a key best practice.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
DWSD supported these various customer service improvement efforts with a complement of employees, volunteers and partners. Staff stepped up to own problems identified in their areas and worked with their leadership to develop sustainable solutions, attended meetings on and off schedule and delivered customer service with PRIDE. Volunteers

provided access to their locations (churches and other gathering places) for community meetings, performed one-on-one outreach to customers, and provided feedback on how DWSD was performing and, DWSD's partners augmented various internal services where needed, took on advisory roles in planning and technology implementation, and supported outreach activities.

Did you partner with other stakeholders or organizations as a part of your implementation process?
DWSD partnered with the Great Lakes Water Authority (GLWA), the State of Michigan Department of Environmental Quality (MDEQ) and DTE Energy, to name of few of DWSD's key partners. The Great Lakes Water Authority is the primary funding source for DWSD's WRAP program. In 2017, the GLWA provided Detroiters with access to $4 million in WRAP funds. DWSD partners with MDEQ to develop long term green infrastructure programming that will help DWSD achieve its managed storm water acreage goals. DTE Energy, the local electric and gas utility partnered with DWSD on over 50 kiosk locations across the City, leveraging a single payment platform for both utilities' customers.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
The most critical obstacle the DWSD had to overcome was organizational inertia. Between 2013 and 2016, DWSD went through a tremendous amount of change. In those three years DWSD experienced a failed organizational optimization effort; a reduction in staff by nearly 1,000 employees; the largest municipal bankruptcy in US history with related pension reductions, retiree health-care elimination and employee annuity claw backs; threats to be sold off and/or privately operated and, finally, a bifurcation resulting in DWSD being pared down from its former internationally recognized regional utility to a distribution and collection system only. This very quick and very bumpy ride left the organization exhausted, a bit shell-shocked and not really looking forward toward the next wave of change.

To overcome this state of mind and move the organization to being willing to adopt new business practices again, DWSD leadership first went on listening tours where the new DWSD Director and new Deputy Director met with every work unit and listened to their stories and concerns and their hopes for the new DWSD. After the listening tour ended, the leadership team developed a new vision for DWSD. Armed with the listening tour feedback and a vision for moving DWSD toward being recognized for its operational excellence, its exceptional and compassionate customer service, and for being an "anchor institution", the DWSD leadership team set out again, but this time with a story of their own to tell (and sell). This time the meetings with staff were ones that painted a vision of where the utility was going to go, how it was going to be an anchor institution and how with their help, this could be achieved.

Listing before talking and then developing a vision and communicating back to the organization gave the new leadership team a legitimate leg to stand on among the staff at-large and provided the foundation for allowing DWSD to move forward down its new path.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
Implementing "smart" technology was a key enabler for many of the customer service enhancements. DWSD invested in a software-as-a-service solution for eliminating lines called QLess. Using QLess, DWSD reduced in person waiting times from hours to minutes across its three service centers, eliminating the lines of customers that led local news stories. Customers make appointments online or via phone and simply show up when they are scheduled to be seen. By partnering with DivDat, a local kiosk and payment platform provider, DWSD was able to not just leverage the same technology that DTE, a $12.6B Detroit-based utility used, but DWSD was able to extend the same solution to a custom mobile application, enhanced with Amazon Alexa skills, and to enable a live connection to its billing system, providing customers with immediate relief from scheduled service interruptions.

Where could other utilities go to find additional information on this Activity Area or the activities / practices / programs that you implemented?
DWSD's website has many related links:

SkipTheLine: http://www.detroitmi.gov/DWSDSkipTheLine
DWSD Kiosks: http://www.detroitmi.gov/DWSDkiosk
Green Infrastructure: http://www.detroitmi.gov/gsi
Keeping your water on: http://www.detroitmi.gov/water

Social Media:

Facebook: https://www.facebook.com/DWSDDetroit
Twitter: https://twitter.com/DetroitWaterDep
YouTube: https://www.youtube.com/channel/UCrKL0yhzoABlYxQ9ZVZXyUQ/videos
LinkedIn: https://www.linkedin.com/in/gary-brown-a218a29

Our partners:

CityInsight: https://www.cityinsight.com
DivDat: http://www.divdat.com
QLess: https://www.qless.com

In The News:

DWSD and Alexa in the news: http://www.fox2detroit.com/good-day/tech-talk/alexa-partners-with-detroit-water-and-sewerage-department

PERFORMANCE MEASURES & RESULTS:

Using the table below, please describe the measures that you use to gauge performance in this Activity Area, including the targets that you set for each measure and your actual outcomes to date.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Walk-in Transactions	Reduction by 10% over previous year	Reduction by 17% over previous year
Investment in affordability	$5 Million	$7.8 Million
Technology platform based payments as a % all payments	40% of all payments are made via a combination of IVR, Web and Kiosk by July 2018	57% of all payments are made via a combination of IVR, Web and Kiosk in April 2018
Collection rate	95% water and 95% sewer by July 2018	93.9 % water and 95.2% sewer in Dec 2017
Revenue recovery	$1.5 million by Dec 31, 2018	$3.4 million in April 2018
Good news media stories	36 positive news stories by July 2018	29 positive news stories in April 2018

Utility Description (combine all plants if a multi-site system)		
Utility Name**: City of Fayetteville Water Resource Recovery Facilities**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Multiple Plants		
Service Area (square miles): 125	Average Annual Daily Flow or Demand (MGD): 13	
Population Served: 100,000		
Location		
Street Address: 1400 N Fox Hunter Rd		
City: Fayetteville State: AR	Country: USA	
Zip Code/Country Code: 72701		
Utility Representative Contact Information		
Name: Tim Nyander	Phone: 479-575-8386	Email: tnyander@fayetteville-ar.gov
If this application has been prepared by another entity on behalf of the utility, provide the information of the preparer below		
Name: Jeff Hickle Greg Weeks	Title: Environmental Projects Specialist Manager of Projects	Contact Information (phone or email): 479-443-3292 jeff.hickle@jacobs.com greg.weeks@jacobs.com

Current Program Members Only **Fill in this section only if the utility has been recognized as a Utility of the Future Today in prior years**
In what year did the utility achieve recognition as a Utility of the Future Today? 2016 & 2017, see 2016 submission for Culture Narrative
In which Activity Area(s) has the utility been recognized previously? Include all Activity Areas for which the utility received recognition in 2016 and/or 2017. _X_ Activity Area 1: Beneficial Biosolids Use __ Activity Area 2: Partnering & Engagement __ Activity Area 3: Energy Efficiency __ Activity Area 4: Energy Generation & Recovery __ Activity Area 5: Nutrient Reduction & Materials Recovery __ Activity Area 6: Water Reuse _X_ Activity Area 7: Watershed Stewardship (__IGP)

Overview

For 32 years, the City of Fayetteville has contracted Jacobs (formerly CH2M) to provide operations and maintenance of the wastewater treatment facilities and its biosolids management site.

Recognizing that WRRF's represent an estimated 12,500 Metric Tons of CO2 Equivalents (MTCO2E) or approximately half the city's annual GHG emissions and electricity being the single largest cost of the wastewater treatment operations, the WRRF staff implements operational practices based on an O&M strategy grounded on energy efficiency to conserve energy and minimize operational cost. Below are some of the key energy related programs that help support our O&M strategy:

Power Generator Installation - The City installed three (3) peak shaving generators and switch gears that help reducing the summertime peak demand on the local energy grid, achieving significant energy cost-savings, and also providing back-up power for the facilities when needed. The ability to shift the facilities' energy source to on-site generators during the hours of critical energy demand has proven overall to be a very cost-effective energy management strategy.

Energy Management – The WRRF staff implemented and maintained energy management control systems, both physical and operational that have provided a cumulative savings of well over $1 million over the life of the project.

Sustainability Activities – Through the implementation of the CH2M companywide sustainability program, the WRRF employees promoted and engaged in sustainable practices that further reduce electrical cost and GHG emission. From shutting off lights in un-occupied areas to embracing new and innovative technologies, the WRRF staff continue to implore new ways to reduce environmental impact and operating cost.

Question & Answer: Respond to the questions listed below in as much detail as possible to provide a guide to other utilities seeking to learn from your experiences and implement similar activities/practices at their system.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
Recovery and safe discharge to the environment of the City's wastewater represents the City's largest, single-source of energy consumption. Consequently, utility management of the City's WRRF's exerts a significant impact on the city's overall energy efficiency policies, goals, and development. The WRRF's operation and maintenance (O&M) management implements an Energy Management Plan that helps guide project staff toward consistently achieving energy efficient in many key areas.

The Power Management Plan represents a major efficiency component of the facility's overall energy management. Exerting the facilities' typical electric consumption during periods of summertime peak demand would not only be taxing on the local energy provider, but would also trigger a significant energy cost increase to the city as a consumer. The ability to shift the facilities' electric source to on-site generators during these hours of critical energy demand has proven

overall to be a very cost-effective energy management strategy. The facilities utilize three (3) peak shaving generators that transfer the WRRF's off the electric grid and onto on-site electric generation. This energy-source transfer reduces peak demand on the local energy grid while also achieving significant energy cost-savings for the city. The city started in 2005 with a single, bi-fuel (diesel-natural gas) generator, and later added two more bi-fuel generators in 2008 as part of a WRRF expansion. This peak shaving strategy has successfully maintained for the city 'Off-Peak' electric cost-rates for over 15 years. By avoiding the higher 'Peak-Setting' (over 350 kVA) electric rates the city has accumulated an estimated $3.3 million dollars in energy cost savings as of 2017. Additionally, the peak shaving strategy has provided the city with an estimated return on investment of 10 years based upon accumulated cost-savings and the capital investment of approximately $2.8M for the generators. In the event of power outage, these units also provided backup power for the entire facilities for up to a full week.

WRRF management utilize the Energy Management Plan for short and long-term decision making, while the plan also provides technicians guidance for developing Standard Operating Procedures and real-time data feedback that direct day to day unit process operations.

Biosolids Management: The development of biosolids management process represents the culmination of long-term strategic planning that has achieved significant improvements in energy efficiency. In YEAR the WRRF's transitioned from land-fill disposal of the facilities' combined biosolids to solar-thermal drying biosolids to a Class-A, beneficial re-use fertilizer. The transition from landfill hauling to solar-thermal drying biosolids equated to several achievements in energy efficiency. Firstly, energy consumption of diesel fuel, and subsequent emissions, have been significantly reduced as biosolids are no longer haul approximately 120 miles away to the nearest available landfill. Rather biosolids are currently transported locally representing an estimated reduction of 800,000 road-miles or 150,000 gallons of diesel fuel and emissions since process start-up mid-2012. The biosolids drying process still represents a significant fuel consumption, however efficiency achievements include the natural gas fuel source being a comparatively cleaner fossil fuel than diesel, and natural gas combustion is a more efficient heat-energy compared to an electric heat alternative.

Additionally, Fayetteville's biosolids drying process is uniquely designed to take advantage of available solar energy by employing a series of solar house dryers that work to extract a majority of the biosolid's water mass prior to the final thermal drying process to Class-A fertilizer. Nearly 25% of Fayetteville's total biosolids volume are processed through the solar dryers which represents a significant reduction of natural gas usage in the biosolids drying process.

Energy Management Assessment: In 2017 CH2M completed an Energy Management Assessment of the city's two WWRF's and the Biosolids Management Site. The assessment provided valuable, high-level analysis of the existing facilities and processes with recommendations on future development or upgrade opportunities for energy conservation. Such information is a valuable addition to the WRRF's Energy Management Plan in guiding both short and long-term decision making and strategies.

WRRF Electrical Upgrades: Currently in the Design Phase, plans are moving forward on significant electrical upgrades to the city's WRRF's. These upgrades should achieve energy savings via updated, more energy efficient components as well as provide opportunities for improved energy conservation planning via sub-metering of critical processes and equipment.

Unit Process Management: Day to day operating procedures that translate into significant energy efficiency and savings include such practices as optimizing the performance of the biological nutrient-removal reactor (BNR) basins such that effluent quality is maximized per individual unit, thus reducing total number of online BNR basin while reducing process energy demands.

Timely Operator responsiveness when taking clarifiers or filter-cell units off or on-line in relation to fluctuating process flows to avoid wasted energy consumption; minimizing excess BNR basin dissolved oxygen (DO) by installing VFD's and water-quality probes that provide Operators greater pump and motor-drive adjustability to minimize excess electrical demand.

Sustainability and Energy Conservation Initiatives: The company sustainability program requires each project to develop a sustainability plan annually with two measurable goals. Over the years, WRRF staff has implemented several programs to make our environmental impact more "green." Below are examples of some of the sustainable practices and results:

Field tested and installed the first supersaturated oxygenation technology, the Supersaturated Dissolved Oxygen Injector (SDOX provided supersaturated dissolved oxygen to the treated water by restricting oxygen loss to the atmosphere such that nearly 100 percent of the oxygen gas fed to the system is dissolved. Side-by-side comparison of the SDOX and the post-aeration systems confirmed that the SDOX increased the effluent dissolved oxygen by nearly 70 percent above the existing system and used 75 percent less power than the existing system. The City of Fayetteville became the first to purchase and install this new sustainable technology in 2007. The investment paid for itself in less than five years with a continued annual savings of over $30,000 a year.

Reduced Noland WWTP exterior lighting by 46 percent, resulting in an annual savings of 47,085 KWh.

Nocturnal light trespass (sky glow) reduction was achieved by turning off the tallest street lights located on the aboveground clarifiers and aeration basin. T-5 light fixtures, that require no warm-up time at startup, are also installed to produce better lighting.

Installed a programmable thermostat and unused insulation from West Side WWTP construction in the Noland Administration Building.

Installed oxygen sensors and controllers for automatic high/low speed control of 16 aerators capable of using more than 1,200 horsepower of electrical power and developed a program to help reduce energy consumption for the biological process at the Noland WWTP.

Decreasing gasoline consumption by optimizing routes taken by O&M staff, implementing no-idling policy for vehicles, utilizing electric carts or bicycles/tricycles for on-site Operator transportation. Conversion of stormwater drainages and swales – typically maintained with weekly, seasonal mowing to rain gardens and native-scapes.

The Energy Management Plan is an invaluable tool that links the parallel goals of maintaining process compliance, producing superior effluent quality, while also maximizing energy efficiency.

The City of Fayetteville Utilities exemplify a culture focused on increasing energy efficiency through responsible and informed management. Several key internal tools and policies have been implemented that facilitate promoting energy efficiency to achieve its commitment to growing into a more energy efficient, resilient community. A significant 2018 accomplishment by the City was adoption of its first
ENERGY ACTION PLAN. The plan provides both a baseline assessment of the city in the areas of Transportation, Energy Supply, Buildings, and Waste while also establishing future improvement goals, outlines action items and provides detailed implementation steps toward promoting energy efficient building and vehicle, renewable energy production, clean air and water, and water reduction for a more energy and resource efficient future. The development and adoption of the City's ENERGY ACTION PLAN speaks directly to the importance of working off a stated directive as a critical first step towards achieving ambitious goals that translate to transformative, tangible energy efficiency and energy conservation achievements in the future. The City also produces an annual Emissions and Energy report that works in conjunction with the ENERGY ACTION PLAN to provide city and utility leadership valuable feedback on natural gas and electricity consumption, total energy consumption, greenhouse gas (GHG) emissions, energy efficiency improvements, along with current and future action items.

This report also includes valuable feedback and planning tools such as report cards on CLIMATE & ENERGY and SUSTAINABILITY. These illustrative tools effectively communicate energy efficiency METRICS, ACCOMPLISHMENTS and GOALS to city leaders as well as citizens.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- Energy Management Plan:

- Power Management Plan: $2.8M capital investment by city for generators; Facility staff support for electric demand and generator operation and maintenance.
- Energy Management: $7.7M capital investment by city for biosolids drying upgrades; projected $2.0M capital investment by city for electrical upgrade design and construction; City investment in Jacobs staff expertise and consulting-resource tools.
- Energy Action Planning, Monitoring & Reporting: Dedicated Sustainability & Resiliency Staff for developing and communication of METRICS, ACCOMPLISHMENTS & GOALS for city utilities; Energy Action Plan development by staff and adoption by citizen elected leadership; energy efficiency by-in from various utility departments aligned with leadership drive and vision.

Did you partner with other stakeholders or organizations as a part of your implementation process?

Energy Management Plan:

- Power Management Plan: PowerSecure, Inc; Arkansas Electric Cooperative Corporation; Ozarks Electric Cooperative
- Energy Management: Jacobs O&M, CLEAResult, Blackhills Energy
- Energy Action Planning, Monitoring & Reporting: A diverse group of local community leadership, City Department Managers, City Council Members, Regional electric and gas utility providers, Jacobs Engineering.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

Energy Management Plan:

- Power Management Plan: Closely monitoring electric grid demands and generator operation to prevent penalty of 'peak' rates for 12-month period.
- Energy Management: Development of SOP's, implementing 'smart' technologies, and cultivating a culture of energy efficiency commitment and awareness among project staff.
- Energy Action Planning, Monitoring & Reporting: The commitment from citizens, city leadership, department managers, to project staff to distinguish Fayetteville regionally as being a trend setter for others to follow in regard to new ways of thinking and employing new technologies and processes to achieve greater levels of energy efficiency.
- Energy Action Planning, Monitoring & Reporting: Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

Energy Management Plan:

- Power Management Plan: Remote Grid Monitoring and Generator Operations via PowerSecure services and Arkansas Electric Cooperative website.
- Energy Management: Instrumentation tied to SCADA monitoring such as clarifier blanket detectors; real-time ammonia, phosphorus, TSS and DO probes. Update & utilize Energy Demand Model to evaluate current vs. modelled scenarios.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
Fayetteville's Sustainability Department, Climate and Energy Program
http://fayetteville-ar.gov/3234/Climate-and-Energy
Fayetteville's Energy Action Plan
https://www.fayetteville-ar.gov/3246/Energy-Action-Plan
PowerSecure Service, http://www.powerprotech.com

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Arkansas Electric Cooperative Corp.'s (AECC) electrical generation & transmission system's instantaneous and hourly Megawatt demand. Potential for AECC's peak-demand setting hour to occur.	Anticipate periods of potential peak-setting electrical demand. Transfer three (3) facilities' power source to on-site generators during periods of potential peak-setting electrical demand. Avoid 350+ KVA Energy Rates; maintain facility operation on 'Off-Peak' Energy Rates.	Peak Demand or 350+KVA Rates have been avoided since 2005. Maintaining the facilities' operations at 'Off-Peak' Energy rates have translated to over $3.3 million of cumulative energy cost savings since 2005.
WRRF's Annual Greenhouse Gas (GHG) Emissions Diesel emissions reduction Gasoline emissions reduction Process Energy Demands	Maintain WRRF GHG baseline in relation to increased population served. Locally dewater biosolids to Class-A, beneficial reuse fertilizer to minimize truck hauling road miles and emissions. Utilize Electric Carts for on-site facility transportation. Update Energy Demand/Consumption Model	MTCO2E estimated to be apprx. constant since 2010 despite significant community growth over same period. An estimated 800,000 heavy truck road miles have been eliminated and an estimated 150,000 gallons of diesel fuel consumption and emissions have been eliminated by locally processing biosolids since process start-up. An estimated 5,200 gallons of gasoline use and subsequent gas emissions have been avoided utilizing electric carts by facility operators. Completed Summer 2017
Energy Consumption (EAP) Greenhouse gas Emissions Inventory Metric Tons of Carbon Dioxide Equivalent (MTCO2E) Emissions Clean Energy Use *WRRF's as significant contributor	Completed in 2017 Reduce MTCO2E by 40% to 866,360 by 2030 Reduce MTCO2E by 80% to 288,787 by 2050 Achieve City of Fayetteville clean energy by 2030	Captured the five largest emissions streams in the City; established a 2010 baseline year for current and future monitoring. Anticipated by 2030, Annually Monitoring Anticipated by 2050, Annually Monitored Anticipated by 2030, Annually Monitored

Utility Description (combine all plants if a multi-site system)		
Utility Name: **City of Grandville Clean Water Plant**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Single Plant Servicing a Regional Collection System		
Service Area (square miles): 138 Square Miles	Average Annual Daily Flow or Demand (MGD): 6.3 MGD	
Population Served: 75,000		
Location		
Street Address: 15 Baldwin Street		
City: State: Jenison Michigan	Country: United States	
Zip Code/Country Code: 49428		
Utility Representative Contact Information		
Name: Mr. Todd Wibright	Phone: (616) 457-0720	Email: wibrightt@cityofgrandville.com

The Grandville Clean Water Plant serves a population of 75,000 and covers nearly 138 square miles. The plant serves both the City of Grandville and four surrounding communities, City of Hudsonville, Jamestown, Jenison, and Blendon Townships. The plant, first constructed in 1964, has undergone expansions in 1971, 1988, 1999. Most notably, in 2012, the addition of the first Egg Shaped Anaerobic digester in the state of Michigan allowed the plant to capture biogas for beneficial reuse in a cogeneration engine for creation of heat and power for the plant. The biosolids are stabilized, and

land applied as beneficial fertilizer on local farm-fields. The plant is a conventional activated sludge facility, using energy efficient turbo-blowers with DO control to conserve energy and optimize the process to accomplish BOD and ammonia removal. Effluent flows to the Grand River.

Organizational Culture

Environmental Stewardship - The City of Grandville Clean Water Plant (CWP) discharges to the Grand River, which hosts a variety of contact related watersports and fishing. The river runs through Spring Lake and discharges to Lake Michigan. Cottages abound, and the drinking water for the entire Grand Rapids metropolitan area is drawn from this general area of Lake Michigan. Employees operate as practical environmentalists, knowing they are the ecological buffer between urban community development and this valuable resource. Some examples of employee driven changes related to stewardship include:

1. Employee driven energy conservation programs (light fixture change-outs, lights-out program)
2. Employee designed and implemented real-time phosphorous analyzer to reduce chemical usage and track and improve on phosphorous reduction to the river.

Employee Engagement to Meet Organizational Goals – The CWP maintains a high level of engagement with their employees, who are empowered to use their ongoing training and expertise to be stewards of the community's watershed and resources, and set goals surrounding these parameters. It is endeavored to delegate the decision making authority to the lowest appropriate level in the organization to help reach those goals. Maintaining safe and efficient operations are key to providing a level of service to the customers and stakeholders that meets the utility's goals. Employees are engaged in the annual budgeting process to assure their ideas are incorporated into the planning and execution of capital and maintenance projects. The results of these efforts have been noted throughout the years, with the organization receiving numerous awards, most notably the Michigan Municipal League Community Excellence Award in 2013; the Egg Shaped Digester and Cogeneration System project being honored in 2013 by ACEC as one of the top 24 engineering projects in the Nation; the EPA Regional Award of Excellence in 2008; and second in the Nation for Outstanding Operations and Maintenance for a Medium/Advanced Plant.

Employees are empowered to make decisions on a daily basis that can affect the outcome of the organizational goals. The CWP has three shifts, so many times, employees are operating the plant with no "supervision" and must be comfortable making decisions, answering emergency calls, and solving problems. These skills are developed over time through employee training, mentoring, and continuous learning, described further below.

Employee safety is paramount; if employees are injured, it affects the ability of the utility to effectively accomplish its goals. Team members participate in a robust safety program, designed and led by the front line workers. Two employees are assigned to head the program and coordinate scheduled training sessions. This employee led training includes video training, presentations, quizzes and informational handouts with which each employee uses to create their own safety manual. Topics cover personal protection equipment, safe operating procedures, OSHA regulatory changes and guidelines.

Learning Organization - Employees are encouraged to improve their knowledge of plant operations and technology, and learn from each other via cross training and job-shadowing. Every team member at the Grandville CWP is encouraged to obtain and maintain the highest level of Operator Certification that is available through the State of Michigan. Of the 15 employees, there are currently 5 Class A operators, 4 Class C operators, 3 Class D operators and 3 new employees. The staff over the last two years has completed over 25 credit hours of classes above and beyond what is required by the CWP, all funded by the City of Grandville. Several new employees are actively working to obtain credentialing as Water Resource Recovery Technicians by participating in training programs administered by the Michigan Water Environment Association. Employees share their learnings and make suggestions for improvements at regular staff meetings, held a minimum of three times per week. These meetings are a forum for discussions of plant operations, efficiency improvements, chemical reduction, maintenance activities, and safety discussions, and are generally led by the employees, not the supervisors. In addition to cost reductions, this constant communication prevents logistical conflicts and ultimately provides a sense of ownership in the facility.

Team members at the CWP are cross-trained for multiple department functions, including: operations, laboratory analysis, and maintenance activities, and more senior employees mentor the newer employees in these functions. This has resulted in creation of a cohesive team, and fills gaps in the organization. The cross training also contributes to continuous learning, and provides opportunities for advancement as lead positions become available. Positions of increased responsibility are **consistently** filled internally by a highly qualified work force due to the cross training and continuing education opportunities provided by the utility.

Utility employees are encouraged to develop leadership and other "soft" skills through active participation in the Michigan Water Environment Association, American Water Works Association, Michigan Rural Water Association and Water Environment Federation. Employees are provided the time and resources to participate in the committees within these organizations, and share their learnings through the morning meetings.

There are monthly meetings between staff level employees and lead operators to set utility goals and empower the staff level employees to take ownership in these goals and assure a pipeline to management for communication of their ideas. Employees are encouraged to participate in the capital planning process to give them ownership in what projects are budgeted based on their goals. This also helps to familiarize them with the process, to allow for career advancement.

Community Engagement - In early 2018, a unique opportunity to demonstrate the collaborative nature of the Grandville CWP organizational culture occurred. Extreme rains over a week-long period created extremely high river levels in the Grand River and other creeks within the collection system. When a flooding situation like this occurred in 2013, high flows and water levels caused a wash-out of the plant biological system, creating a month's long struggle to maintain permit limits and re-establish the treatment process. During the 2018 flooding event, engagement by an empowered plant staff resulted in a "split" of the plant into two "trains" by a creative use of the pumping and valving scheme available at the plant. Flow far in excess of the plants peak hydraulic design was treated and discharged, while preventing washout and preserving the microorganisms. The permit limits were met through the entire event!

Experience with the flooding events of 2103 and 2018 led the Grandville CWP to reach out to the community to establish a footing drain disconnection program. A key aspect of the program was education, informing the residents of the presence of footing drain connections and the impact they have on contributing to excessive flow at the CWP and the general impact on the watershed environment. Options were presented for removal of the connections. Tracking of river water levels versus influent flows has been put into place to determine if the program is having an effect on the quantity of water discharged into the sanitary system during storm events.

The Grandville CWP reaches out to the community in other ways. Presentations are given at the Lower Grand River Organization of Watersheds and Friends of Buck Creek to help inform the community of the contributions made by the CWP. Staff members from the Grandville Clean Water Plant are active at community events, handing out educational brochures and displaying information about the treatment process. Representatives of the CWP participate in American Public Works Association National Public Works Week events every year. Quarterly public meetings are conducted with the community partners served by the plant to update them on key metrics of plant operation (such as permit compliance, utility utilization, etc.), ongoing and upcoming projects, and budget items.

One additional community engagement aspect is the land application of the biosolids. The CWP staff must engage with local farmers to procure fields on which to apply this product as a beneficial fertilizer and soil amendment. This requires education and outreach to the public and is of extreme importance to the long term operational goals of the plant as a Utility of the Future.

During the 2012 expansion, as new Laboratory and Operations building was constructed. It was planned into the design to have a large training and meeting room that could be used by the plant staff as well as the general community. This is open to community use, and free of charge during normal business hours.

Stakeholder Engagement - The City of Grandville regularly provides educational tours to local schools, youth groups, professionals in the field, other waste water plants, and equipment companies. The CWP is pursuing additional opportunities to educate the public and community about the plant's purpose and goals. The CWP feels it is paramount for the community that it serves to understand how the Clean Water Plant operates and protects the community, downstream water users and the surrounding environment. The educational events, include a full tour of the facility and an educational brochure about various steps of the treatment processes. The plant is maintained in a clean and

well-kept condition, and the employees take pride in this appearance and how the community views the work that they do.

Energy Generation & Recovery

The Grandville Clean Water Plant (CWP) has taken substantial steps toward energy generation and recovery over the last decade, and has plans to work towards a plant that is "off the grid", resilient to climate change, as well as less dependent on non-renewable cost factors such as natural gas and power. This is a multi-step process, that partners closely with energy efficiency. The following highlights the steps taken towards energy generation and recovery. Outlined below are some of the practices, activities, and programs that have been implemented in the last decade, or are currently underway at the CWP related to energy generation and recovery:

- Replaced old, inefficient, gas-mixed digester system and leaking gas-holder roof with an energy and process efficient Egg Shaped Anaerobic Digester.
    - *Implementation of this improvement resulted in a large increase in the biogas produced per pound of solids, and a greater reduction in solids to disposal, reducing utility costs.*
    - *The digester can also be loaded at a higher solids percentage and has the ability to be converted to a Class A process as future needs dictate.*
- Installed a dual-membrane gas-holder cover for storage and efficient utilization of produced biogas.
    - *Biogas was previously leaking out of the old gas-holder roof and/or being flared.*
    - *This addition allows efficient utilization of the biogas through the cogeneration unit and minimizes flaring.*
- Added a dual-fuel cogeneration unit that utilizes biogas in an internal combustion engine to produce both power for the plant, and heat for a hot water loop.
    - *Dual fuel cogenerator allows for flexibility in using bio-gas or natural gas, essentially making this power and heat-source independent of the electrical utility grid for resiliency.*
    - *The hot water loop saves significant energy and money for the utility by capturing the heat from the cogeneration engine and using it to maintain digester temperatures and to warm the process and laboratory/operation building.*
- Designed new laboratory and operations building with in-floor and in-duct radiant heating system to allow for the cogeneration hot water loop to be used for heating during the winter months.
    - *Thorough project planning and foresight allowed for the new building and cogeneration unit to work together to provide "renewable" heat for this building.*
    - *Significant savings are achieved by reducing natural gas needing to be purchased - a step towards neutrality.*
- Replaced outdated and inefficient boiler with a new dual-fuel wet-back boiler for process and building heat using biogas (if cogeneration unit is short on BTU's).
    - *In the event that the cogeneration engine is off-line, the CWP has the ability to utilize biogas for process and building heat. A dual-fuel boiler allows the use of digester gas to the fullest extent possible.*
    - *This also adds to the resiliency of the plant against external utility factors.*
- Integrated Energy Management System computer program set up to balance the electrical and heat demands of the process equipment and heat loads.
    - *The more power is produced by the cogeneration unit, the more heat is produced as well.*
    - *This computer program provides the operators with the information needed to optimize and balance the use of digester and natural gas in fueling the engine generator, creation of power, supplying heat to the anaerobic digester, and providing building heat.*
- Designed a heat recovery unit (HRU) into the new digester/blower building in order to capture heat from the blowers, boilers, and process equipment to heat the space.
    - *This equipment negated the need to install a gas fired makeup air unit on the building, and has resulted in substantial cost savings.*

- Recently completed "Methane Management Plan" to review if more efficiencies or cost savings could be garnered from various biogas utilization technologies since there is currently more production occurring than utilization.
    - *The study determined that upgrading some of the biogas to natural gas pipeline quality could capture significant economic benefit through Renewable Identification Number (RIN) credits showing a pathway to vehicle fuel.*
    - *Authorization is expected to move into design in 2018 and will include more biogas storage, gas cleaning/upgrading skids, and pipeline injection station.*
- Recently completed "Biosolids Master Plan" which reviewed efficiencies with digester operation to increase biogas production as a function of processing thicker sludge into the digester.
    - *Currently WAS is co-settled, reducing primary clarifier efficiencies and leading to increased blower energy demand to treat the primary effluent.*
    - *Separate thickening WAS in a dedicated process will allow for thicker solids to enter the digester*
    - *The result will be more consistent biogas production and providing additional room in the digester for substrates.*
- Receiving station for FOG planned into upcoming biosolids management project.
    - *Once more room is created in the digester and a pumping station is designed for the thickened WAS, a receiving station can be implemented to accept liquid substrates to be pumped into the digester and increase gas production.*
    - *This will be managed through the IPP program to assure quality feeds that won't have any detrimental side effects.*
- All projects completed on-site have to have energy efficiency and energy generation evaluated.
    - *For instance, wind power has been evaluated for tall buildings on-site,*
    - *Microturbines have been evaluated for implementation with projects related to the outfall for capturing hydropower.*
    - *So far, these projects have not been implemented. In some instances the generation has not met the minimum required feasibility measures to be implemented.*

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- *These activities have taken place over the last decade, and have occurred with cooperation from City Management, Plant Staff, and Engineering support.*
- *Each activity or practice was reviewed individually on merit of implementation, and had to take into account non-economic factors for a triple bottom line approach to decision making.*
- *The level of service of the system was held paramount through these projects through project reviews against these metrics.*

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- *Financial resources were required for all of the activities listed above, as most of them involved capital equipment or engineering evaluations.*
- *The staff participated in each project from the evaluation process to the implementation and monitoring of the success of each one.*
- *Time was another resource required, as each activity required some level of vetting, design, construction, and startup to be successful. Each component can still be "optimized" on a daily basis by the staff.*

Did you partner with other stakeholders or organizations as a part of your implementation process?

- *Yes.*
- *The customer communities (City of Hudsonville, Georgetown, Jamestown, and Blendon Townships) which the Grandville CWP serves were involved in the decision making process and financial contributions necessary to implement these activities.*
- *Other local organizations such as the Lower Grand River Organization of Watersheds and Friends of Buck Creek were informed of some of the unique features being implemented at the CWP as part of outreach.*

- *Also the City Councils of Grandville and the Customer Communities all had in-depth presentations from the engineers to assure them that their capital was being spent wisely and on the right items.*

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- *Education of Councils and other stakeholders to assure them that the long term operational goals of the treatment system were being considered, and that the ratepayers would not be unduly burdened with costs.*
- *This was done through careful consideration of how the capital was being spent, the paybacks and triple bottom line analysis, and education and outreach.*
- *Grandville would suggest that all other utilities thinking of investing in this type of infrastructure have their council members take tours of their existing plants and also look for neighboring plants that are implementing these changes. Showing the social considerations beyond the financial paybacks will help push these projects forward.*
- *Our experience is that most people have no idea that this can be accomplished at a treatment plant, and they get very excited when they learn of the possibilities.*

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

- *Yes.*
- *The plant uses a robust SCADA system to monitor and control various activities related to the energy generation components of the plant.*
- *Eramosa E-RIS software has also been implemented to query and monitor operational parameters to allow tracking, trending, and targeted reporting over time.*
- *As mentioned previously, an Integrated Energy Management system program has been installed to help manage and balance the electrical and heat demand to be most-efficient.*

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- *Please call Todd Wibright (Superintendent) at (616)457-0720, or email* wibrightt@cityofgrandville.com*.*
- *The City website offers general information on the treatment plant at* https://www.cityofgrandville.com/departments/clean-water-plant/plant-profile*.*
- *There have been many presentations regarding the Egg Shaped Digester and cogeneration system presented at various MWEA conferences. These can be found by typing "Grandville Egg Shaped Digester" into Google.*

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Bio-gas Production	72,000 cuft/day	130,000 cuft/day
Methane Percentage	60% methane	64% methane (average)
Average Power Production via cogeneration Unit	175 kW	180 kW average (2017)
Percent of power produced via cogeneration Unit	25% of total plant power	33% of total plant power (2017)
Natural gas BTU offset from biogas heating in buildings	5000 MMBTU/year	Varies (due to changing winter temperature conditions, but exceed 5000 MMBTU mark on years of average winter temperatures)
Carbon Footprint Reduction	1500 tons of CO2/year	Estimated 1750 tons of CO2/year
Future percent of power produced from non-utility sources	90% of total plant power	Pending biogas upgrading project design and implementation slated for 2018.

/PI)

Utility Description (combine all plants if a multi-site system)		
Utility Name: **City of Tallahassee Underground Utilities/ Public Infrastructure (UU/PI)**		
Type Advanced Water Reclamation Facility (AWT) Thomas P. Smith Water Reclamation Facility 26.5 MGD capacity, 27 water wells 79.5 MGD capacity, water distribution system (1,200 miles), wastewater collection system (1,140 miles), 108 wastewater pumping stations, stormwater management system which includes 484 ponds, 390 miles of stormwater drains, and 26 miles of canals. In 2015, the Utility merged with public works to make the department the largest in the city at over 500 FTE' s This added additional responsibilities of street and sidewalk maintenance as well as maintenance of stormwater drainage ditches and canals.		
Service Area (square miles): 250 sq. miles	Average Annual Daily Flow or Demand (MGD): Wastewater 17 MGD Water 26.2 MGD	
Population Served: 275,000		
Location		
Street Address: 4505-B Springhill Road		
City: Tallahassee State: Florida	Country: United States	
Zip Code/Country Code: 32305		
Utility Representative Contact Information		
Name: Joseph Cheatham	Phone: 850-891-1009	Email: Joseph.Cheatham@talgov.com

If this application has been prepared by another entity on behalf of the utility, provide the information of the preparer below		
Name: Joseph Cheatham	Title: Wastewater Ops. Mgr.	Contact Information :850-891-1009 Joseph.Cheatham@talgov.com

Organization Culture

The City of Tallahassee Underground Utilities and Public Infrastructure was created in 2015 by combining its Water, Wastewater, Stormwater and Natural Gas Systems with its Public Works Department. The newly re-organized utility restructured its operations and customer service model and inherited functions related to streets, drainage, engineering and sidewalk infrastructure. Now known as the City of Tallahassee Underground Utilities and Public Infrastructure (UU/PI), the organization has over 500 employees responsible for five (5) division's, each working in partnership with the others to provide seamless services to its customers. The organization has leveraged this new challenge to improve service delivery, and through a more effective utilization of staff, technology, and training programs to provide high quality customer service in a more qualitative, expeditious and cost-effective manner.

The organization uses the Florida Sterling Council Business Model as its program for continuous improvement by focusing on:

1. Visionary Leadership,
2. Strategic Planning,
3. World Class Customer Service,
4. Knowledge Management,
5. Empowered and Engaged Work Force,
6. Process Management, and
7. Continuous Focus on Results.

This business culture led to the Utility being named the first public utility in Florida to win the coveted Florida Governors Sterling Council Award in 2015. The award proves that the City of Tallahassee UU/PI is a role model organization in Florida that has excellent overall performance in all seven categories of the Sterling Business Model. This award is the state version of the national Baldrige Performance Excellence award. In addition, in 2018 the City of Tallahassee UU/PI became the first public or private Utility to win the Florida Governor's Sterling Sustained Excellence Award. By becoming a sustained performance role model means we have exhibited a system and culture of performance excellence, including organizational sustainability, improved organization governance, continuous learning and risk taking, and strategic adaptability.

The organization has a mature leadership system, with multiple means for building relationships, engaging its workforce, customers and stakeholders in the community. Senior leaders actively demonstrate their commitment to the values and mission of the organization through the department values, vision and mission statement, customer credo and employee promise, participation at meetings at all levels and continuation of their own learning. Ethical and legal accountability are demonstrated through compliance reviews, a dedicated ethics officer, and anonymous hotlines. Senior leaders communicate to its workforce through a department portal, all hands meetings, tail gate meetings, and through the city webpage.

Senior leaders are committed to the community and engage customers through their own participation in multiple outreach events, home owner association meetings, civic presentations, and City wide special events such as neighborhood cleanup, and habitat for humanity projects. The utility also is the sponsor for the communities Holiday Parade and Springtime Tallahassee Celebration.

The organization values its workforce members and engages them in high performance work practices. Beginning with team based interviews and to the highly recognized on-boarding process, the organization strives to hire the right person to fit the culture that has been established. New hires go through a two-day new hire orientation and meet all division senior leaders. They are introduced at senior leadership team meetings where they get a broad perspective of

the entire organization. The strategic advantage of the City of Tallahassee UU/PI is attractive benefits and competitive compensation.

A knowledgeable workforce is important to the organization and employees have multiple educational and training programs including industry specific training, city HR & Safety training, Certified Public Manager through Florida State University, six sigma, yellow and green belt teams, leadership academy, attending WEF and FWEA conferences and participating in the departments career progression program. Participation in the career progression program is mandatory for new hires. Eighty Six percent of the organization has a career path to participate in. Sixty three percent of the departments employees have seen upward mobility. Employees are recognized for high performance with a variety of awards, pay increases as they progress, reclassifications, and potential for bonuses for high performance team participation or one-time tasks that positively impact the organization. In addition to career progression training, the organization promotes supervisory and leadership training to promote our future supervisors from within. Some divisions have a mentoring program in place for new hires and for those that request a mentor. Since 2014, the organization has used the Gallup Q12 survey to measure employee engagement. Overall results show favorable trends over the past 3 years.

The organization has an active wellness program that includes lunch and learn workshops, exercise classes including yoga and Zumba, wellness competitions, wellness incentives for preventative wellness care (personal leave awards) and wellness fairs. The program promotes diet, exercise and regular wellness checkups.

The organization participates in the Florida Benchmarking Consortium (FBC) in the water and wastewater service area utilizing 24 performance indicators with clearly defined definitions. The performance indicators are used to share data with over 35 other cities and counties in Florida to determine high performers. The organization consistently has been recognized in the top 5 performers in the FBC since it started participating in 2006. The best take- away from this process is learning and implementing “best practices” from other high performing utilities in Florida. The organization has also benchmarked with other organizations outside our industry such as University of Florida Shand’s Hospital in employee engagement and Ritz Carlton hotels in customer service.

Safety is one of the highest priorities since water/wastewater industry is one of the most dangerous occupations in the US. The departments safety program includes safety manuals, safety training, safety committees, safety posters and job safety analysis is conducted on all major work practices. The organization conducts monthly safety briefings and utilize online computer safety training that can be utilized on night shift operations. Department has 2 full time safety/training officers.

The organization has an intense focus on the protection of public health, safety, and the environment as it designs its products, services, and work processes to meet key industry standards and regulatory compliance. Environmental stewardship and leading-edge technology are two of the organizations core competencies, and as such, the organization strives to incorporate best practice strategies and innovative technology into the design and operations of the Utilities water resources. The organization is heavily regulated but strives for excellence in addition to compliance. The organization was one of the first utilities to be certified in ISO 14001:2004 in 2007 in the state of Florida and was one of the first in the nation to be certified in ISO 14001:2015. The Environmental management system (EMS) provides tools and an operating system that are being deployed across the entire department. While originally established in the Wastewater Treatment Division in support of the ISO 14001 certification, the organization recognized the benefits of the robust and well documented system and is deploying it uniformly across all divisions. EMS Implementation Teams, the EMS framework, as well as EMS tools are being leveraged across the department as a continuous improvement toolset when combined with PDCA. This helps to ensure continuous improvement, regulatory compliance and protect the community’s environment.

The organization uses financial and operational data and information to manage its daily operations and to identify current performance trends and potential areas for improvement. Each month the Senior leadership team reviews the financial Report card that provides critical information regarding the organizations fund balances, cash flows, and financial status of current capital projects segmented by each operational division. The constant surveillance of this data enables the organization to maintain its AA+ bond rating.

The organization manages its data through graphical displays on the portal which measures environmental impacts. The organization continuously monitors its operation through SCADA systems. Data is reviewed daily for its water resources utility systems which in include water production and distribution, wastewater collections and treatment, reclaimed water systems, biosolids production and marketing, storm water management and overall energy conservation.
The Utility has won numerous other awards including the FSAWWA best tasting drinking water three times in the last ten years including back to back wins in 2016 and 2017, State champion FWEA Operations Challenge 2009, 2015 FWEA Phelps Award for AWT Category, 2013 FWEA Beneficial biosolids Award, 2014 FWEA Reuse Award

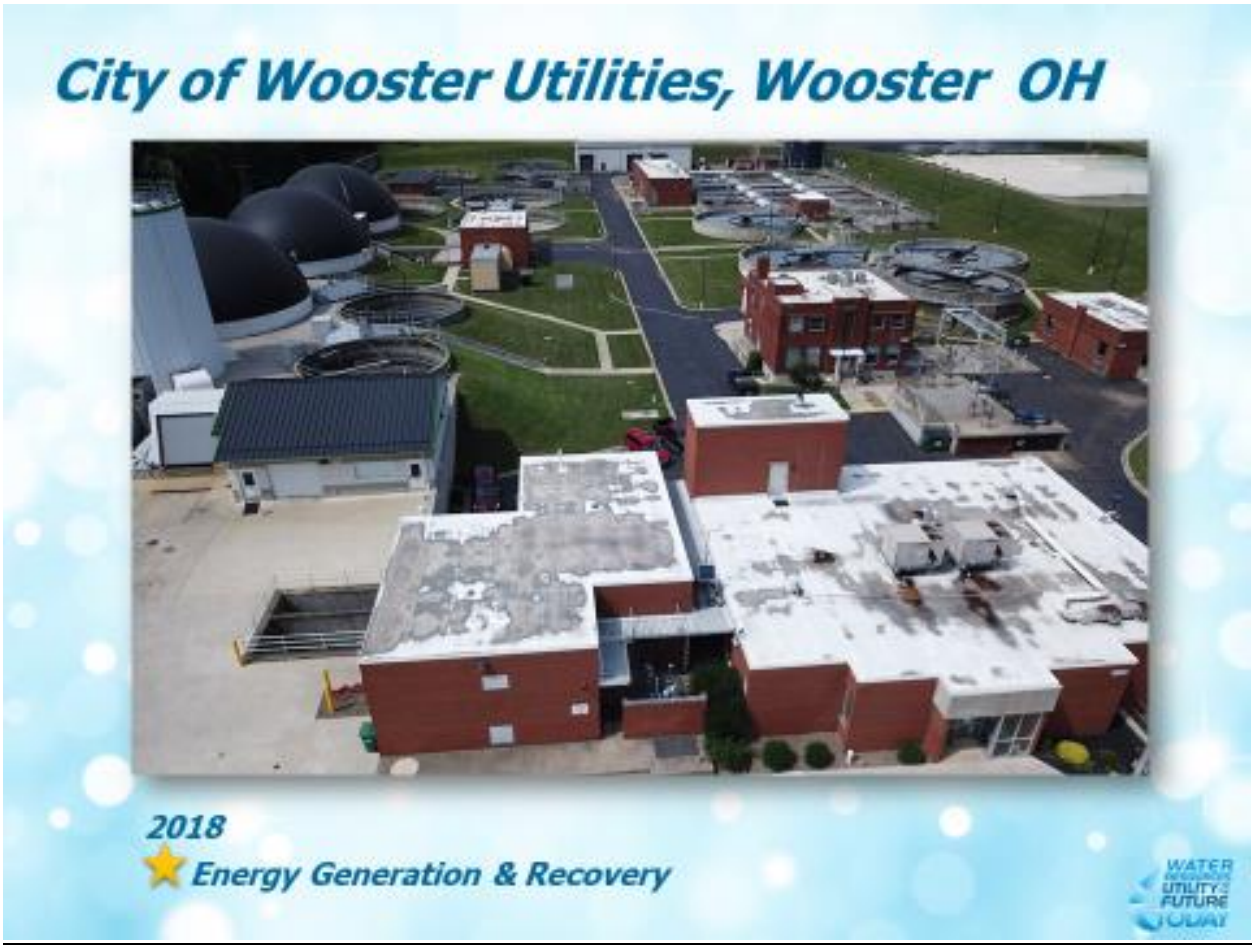
Your Performance Measure(s)	**Your Results (quantitative or qualitative)**
Percent of staff enrolled in career progression	86% Target 90%
Number of days to fill vacant positions	59 days Target 60 days
Employee participation in wellness programs	32% Target 50%
Days of Cash on hand (Reserves)	205 days Target 150 days
Bond Rating	AA+ Target AA+
ISO 14001:2015 Compliance Audit-Findings	0 Major Target 0) Major

Beneficial Biosolids Reuse

- Biosolids treated to Class AA EQ standards through gravity belt filtration, anaerobic digestion, centrifuge dewatering and Andritz Thermal Dryer. Biosolids meet Class AA standards 100% of the time. Produce 3,000 tons of Class AA pellets per year.
- 100% of the biosolids are marketed to chemical fertilizer companies, sod farms, golf courses and a portion is bagged and sold at retail department stores.
- Biosolids program is managed through ISO 14001:2015 environmental standards since 2007.
- Treat septage and Fog through anaerobic digestion and ultimately Class AA standards. Septage is received from a four-county area as a public service and protection of public health.
- Homeowners who own septic tanks who have access to the City's sewer service and would like to connect to the system can finance the entire cost for up to 10 years through the City's low interest sewer loan program (Septic to Sewer Program). Charges are added to their utility bill and payments are made monthly through the normal utility billing process.

Your Performance Measure(s)	**Your Results (quantitative or qualitative)**
% of Biosolids beneficially used vs. total volume produced	100% Target 100%
Lbs. of Polymer/dry Ton produced	45lbs/ton Target < 50 lbs./ton
Permit Compliance Ratio	100% Target 100%
Septage/FOG received 7,200,000 gallons	Septage/Fog treated 7,200,000 gallons
Number of ISO 140001 Major Non-conformance	0 Target 0

Additional webpages for information:
https://www.floridasterling.com
http://www.talgov.com/you/you-water.aspx
http://wakullaspringsalliance.org/
http://www.flbenchmark.org/
https://www.iso.org/standard/60857.html
http://rrstormwater.com/city-tallahassee-stormwater-management-regulation-compliance
https://www.youtube.com/watch?v=wPmC1S5ImT4



Organizational Culture

The City of Wooster is the county seat of Wayne County in Northeast Ohio with a population of just over 27,000 people. The City is home to the College of Wooster and two subsidiaries of The Ohio State University: the Agricultural Technical Institute (ATI); and the Ohio Agricultural Research and Development Center (OARDC), a teaching and research facility dedicated to agricultural science. The recently created BioHio Research Park (BioHio) is driving new innovation in the agbiosciences by providing a vehicle for moving technology to the marketplace with facilities and entrepreneurial support for prospective companies. BioHio's emphasis on bioenergy & bioproducts, food production & safety, human and animal health and environmental management & engineering has and will continue to serves as a catalyst to new business growth in Wayne County and Northeast Ohio.

Wooster remains an agricultural center for Ohio. As the City moves forward, sustainability has increasingly become an area of focus for many members of the community. Over the past few years, the City and other local institutions have engaged in several sustainability commitments, including energy efficiency, recycling, and infrastructure for active transportation initiatives. Many of the local residents, businesses, and institutions also have started to work on making their own properties and organizations more sustainable.

The City of Wooster's Sustainability Roadmap is a three-year plan that defines the integration of sustainability throughout city operations, develops committed teams, and establishes creative solutions, strategies, and measurable goals along the way. Designed to serve as a communication tool for stakeholders, the roadmap enables the City to link strategic initiatives with business plans, while demonstrating environmental stewardship and social responsibility. City employees, with support from AEP Ohio's Community Energy Savers pilot program representatives, led the City of Wooster Sustainability Roadmap efforts. The roadmap leverages existing energy and sustainability initiatives already in the planning or completion phase. The result is an actionable plan that targets environmental, economic and social priorities to achieve the City's goal of creating a more sustainable and engaged community.

Additionally, the plan offers various tips for residents and businesses to reduce energy consumption and adopt sustainable practices at home or in the business place. The roadmap is organized into three sections, each section highlighting established goals and action steps for achieving those goals, along with targeted timelines and responsible parties. The Key Performance Indicators (KPIs) identified throughout the Roadmap serve to provide measurable value to demonstrate the City's effectiveness at achieving key sustainability objectives over a 3-year period. This commitment to sustainability is part of the reason Wooster has been named *Ohio Magazine: "Best Hometown 2017"*, *Money Magazine: "37th Best Place to Live in America"* and *Financial Times: "#4 FDi Strategy for Top Micro American Cities of the Future"*

Within the City of Wooster's Utilities Division, each employee is encouraged to contribute and collaborate to reach the goals set forth by the Community, City Administration and Utility Management. As part of that collaboration, the Division works closely with OSU ATI to develop educational opportunities for both utility employees and OSU students. The Division has provided internship positions in both Laboratory and Operations for students in the university's Bioenergy and Biological Waste Management program and is an active member on the program's Advisory Board. In turn, many of the Utility Staff have completed courses in the program to further their understanding of anaerobic digestion, feedstock evaluation, biosolids disposal and bioenergy production. In addition, the Water Resources Recovery Facility (WRRF) is facilitating an "off campus laboratory" to allow students to complete "real world" analysis at the plant.

The Utility management also encourages continuing education through certification exam preparation classes, attendance at AWWA and WEF district meetings and state conferences, hosting multiple training courses throughout the year and assisting in the development in each team member's professional development program to help them reach their career objectives. These steps ensure the team members are ready to grow when the next promotional opportunity becomes available and continue the City's long history of employee retention. Just as Ohio is known as "the Cradle of Coaches" in regard to football, one of our goals is to provide the tools for each utility employee to excel and become a future industry leader within our organization or beyond. When one of our "home grown" leaders have the desire to advance their career outside of the City, we want to give them an advantage to land that next promotion because they were trained and educated here. When their next employer receives a resume stating that the applicant was trained in Wooster, they will know that they are getting a valuable addition that can contribute on their first day.

The Utilities Division regularly tracks and compares performance indicators to ensure that we are providing the best service while balancing rates with investment in the system through capital improvement projects. In cooperation with the City's Engineering and Finance Divisions, the utility maintains a capital improvement project planning document that strategizes 10 to 20 years forward to track the infrastructure (plant and system) needs and also a 10 year forecast of rate adjustments to guarantee the funding will be available to execute the plan projects. Each year, both the planning document and rate forecast are evaluated and adjusted based on necessity and published for the stakeholders. This "open" communication allows local industry and residents to budget for the future rates and also plan for investments in their operation founded on conservation measures. The City has realized smaller, planned increases over time help keep rates lower, assist our stakeholders with planning and promotes economic development.

Energy Generation and Recovery

When the City of Wooster's original Sewage Treatment Plant began operation in 1938, it consisted of primary settling tanks, an anaerobic digester and sludge drying beds. Even in 1938, Wooster was trying to "raise the bar" in regard to sustainability and efficiency. The underground concrete digesters (tankage still in use today) were constructed with a glass block "roof" over the pipe galley that sat between the two tanks. The glass block allowed the sun's rays to light the galley during the day and provide some heat within the space. The methane created in the process was used to operate a dual purpose boiler that provided heat to the Operations Building as well as the digesters. When secondary treatment was added in 1965 along with an additional digester, the methane was utilized to fire an engine connected to a blower for the aeration system to reduce electrical costs and an additional boiler to maintain digester temperatures. In 2007, as part of an extensive plant upgrade, a 375 kilowatt combined heat and power (CHP) unit was added to provide peak shaving capability and approximately one half of the plant's electrical demand. The CHP was never fully utilized due in part to poor methane production and excessive maintenance required of the gas scrubber system. After the upgrade,

the plant experienced multiple permit violations and eventually was placed under OEPA Director's Findings and Orders to make additional improvements to meet permit compliance.

A forensic evaluation of plant performance found that digestion and solids handling (untouched in the 2007 upgrade) was inadequate and required capacity improvements. The City evaluated several proposals and formed a public/private partnership with a company that already had interests in the area at OSU ATI. They operated a small digester and provided power for the campus as well as learning opportunity for students in the university's Renewable Energy program. The private company provided some capital investment, engineering , construction and knowledge while the City delivered manpower, infrastructure and paid a monthly management services fee. The three existing digesters were enlarged and new mixing, cover membranes and heat exchangers were all added along with a gravity belt thickener (for City biosolids), a solids receiving vault, a liquids receiving pit and a feedstock holding tank. The 375kw CHP was removed and replaced with a 1.1Mw CHP which heated the new organic biosolids receiving building and all the tankage in the anaerobic digestion system (ADS). In order to produce enough methane to utilize the larger CHP and supplement the City's biosolids, organic third party waste streams were accepted at the ADS. Tipping fees were collected by the private partner and the City could offer discounted fees to benefit local businesses or as an economic development tool to attract new business to the area. The City's Water Pollution Control Plant is now known as the Water Resources Recovery and Bioenergy Facility.

Within 12 months of startup, the power generation was exceeding the facility's daily demand and putting the City's net metering agreement with the local electric utility in jeopardy. At one point, power generation ceased to keep the agreement in place. To optimize the ADS, the City installed an electric transmission line to the nearby Water Treatment Plant and eliminated the electric meter at that location. At times, when the ADS is at full capacity, both facilities are "off the grid" to become what may be the first electrically self sufficient water/wastewater utility.

1. ***How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?*** After the decision was made which proposal to choose, City management met often with the private party to plan for operational changes, forecast obstacles and develop action plans to make the process as smooth as possible. Utility management held daily update meetings between operations staff, construction crews and the ADS designer to ensure that everyone was on the same page and to mitigate issues quickly when they did occur. These meetings continued throughout construction, startup and early operations.
2. ***What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)*** After the large capital expenditure of an upgrade that failed to meet any of the goals and objectives of the project, the primary resource was local support from the City Administration and council. Fortunately, they believed in our vision and our ability to bring the project to fruition. City Council unanimously approved the capital to begin the project and offered their support throughout construction, operation and it continues today. Even though our staff was familiar with anaerobic digestion, they did have to adjust their routines to accommodate the "new" processes. Without exception, they embraced the new responsibilities and quickly incorporated many of their ideas to improve the overall performance. From a management perspective, we set the bar high and each time our people rose to the challenge
3. ***Did you partner with other stakeholders or organizations as a part of your implementation process?*** Partnering with a "local" company made the transition much smoother. Also, it made garnering support from the mayor and city council much easier. The City was familiar with their leadership and organizational principles and since many of their employees lived in the City, it was to everyone's advantage that the project be successful. We knew who to contact when questions would arise and where to get information when we needed it.
4. ***What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?*** When joining two organizations that have different goals and motivations, it is sometimes difficult to find common ground. The City Utility's main goal is to provide a public service and cover operational costs. A private partner is in business to make money and get a return on their investment. It took longer to negotiate the contract than it did to make the improvements at the facility. The most important piece of the project was putting together an agreement that protected the interests of both parties without placing too much risk on one side or the other.
5. ***Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.*** Smart technology has allowed us better tracking of our power generation/usage. The SCADA system gives

us the ability to see trends in gas production and in turn, balance the loading coming into the ADS to avoid process upsets. The capability to see all the available data at once gives us better control and permits us to make better decisions about our operation.

6. ***Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?*** The City's Sustainability Roadmap is available online at; https://www.woosteroh.com/living-here/sustainability-roadmap. We have also found useful information from the American Biogas Council on their website; http://www.americanbiogascouncil.org

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Reduction of Energy Costs	Recognize $200,000/yr in savings by 2019	Current pace to recognize $144,400 in savings for 2018
% of energy generated vs. total energy used	50% onsite generation by 2019	Currently averaging 28%

Utility Description (combine all plants if a multi-site system)
Utility Name: **Clean Water Services**

Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional water resources management utility		
Service Area (square miles): 122 square miles	Average Annual Daily Flow or Demand (MGD): 82.5 MGD	
Population Served: Nearly 600,000 residents		
Location		
Street Address: 2550 SW Hillsboro Hwy		
City: State: Hillsboro Oregon	Country: United States of America	
Zip Code/Country Code: 97123		
Utility Representative Contact Information		
Name: Mark Jockers	Phone: 503.681.4450	Email: Jockersm@cleanwaterservices.org

Current Program Members Only
Fill in this section only if the utility has been recognized as a Utility of the Future Today in prior years

In what year did the utility achieve recognition as a Utility of the Future Today? 2016

In which Activity Area(s) has the utility been recognized previously? Include all Activity Areas for which the utility received recognition in 2016 and/or 2017.

___ Activity Area 1: Beneficial Biosolids Use
_X_ Activity Area 2: Partnering & Engagement
___ Activity Area 3: Energy Efficiency
_X_ Activity Area 4: Energy Generation & Recovery
_X_ Activity Area 5: Nutrient Reduction & Materials Recovery
___ Activity Area 6: Water Reuse
_X_ Activity Area 7: Watershed Stewardship (__IGP)

Energy Efficiency

At Clean Water Services (CWS), our practices related to energy efficiency are concentrated where the need is greatest: at our resource recovery/wastewater treatment facilities. Although all CWS activities—from flow restoration and ecological enhancement, to stormwater management and administrative functions—consume some energy, the vast majority of the demand comes from the facilities operated by our Wastewater Treatment Department (WWTD). In Fiscal Year 2016-17 (FY17), for example, our two largest facilities—Durham and Rock Creek—used over 51 million kilowatt hours (kWh). It is therefore WWTD that has taken the lead in energy efficiency in recent years, through practices, activities and programs. Approaches and projects include:

Approaches

- Created an Energy Team composed of operators, mechanics, electrical and instrumentation staff at Durham and Rock Creek.
- Empowered the Energy Team to generate ideas and to implement changes.
- Host bi-annual energy events to generate new ideas in a lively and positive atmosphere, including Energy Treasure Hunts where Energy Trust experts and staff look for opportunities during a facility walkthrough.
- Set clear goals, monitor them, and convey results in a timely and clear manner. For example, the Energy Performance workbook includes a callout box that says “Down is Good. Congratulations! You have saved _____ kWh through implementation of your energy efficiency actions.”

- Undertake annual projects that aspire to improve energy efficiency beyond levels already realized. One such target is a reduction of 750,000 kWh through Operation and Maintenance-initiated energy efficiency measures.

Specific Projects

- **Digested sludge tank:** Durham decommissioned a digested sludge tank mixer that had been operating continuously and realized an estimated savings of 210,000 kWh/yr ($12,600/yr).
- **Lighting upgrades:** Rock Creek replaced more than 150 fluorescent fixtures with LED fixtures at the Dewatering Building, which saved over 160,000 kWh/yr ($9,600/yr) and dramatically improved lighting quality in this process area.
- **Nonpotable water system improvements:** Rock Creek saved nearly 170,000 kWh/yr ($10,150/yr) by implementing improvements to the secondary clarifier spray systems that reduced the use of nonpotable water, decreased pumping and retreatment requirements, and improved the performance of the system's scum removal.
- **Aeration mixer control:** Rock Creek implemented timing controls to operate mixers in aeration basin cells 1-4, reducing the overall run time by 90 percent. Estimated energy savings is over 440,000 kWh/yr ($26,400/yr).
- **Blower VFD conversion:** Durham installed three variable frequency drives on the secondary and tertiary blower systems to improve part-load performance. This saved an estimated 1,415,650 kWh/yr ($85,000/yr).
- **Reduction in grit channel operation:** Durham has four grit channels that operated continuously. This project reduced the number of operating grit channels to two, which better matches the flow through the plant during most operating conditions. Estimated energy savings is 140,000 kWh/yr ($8,400/yr).
- **Optimize PEPs control valves:** Rock Creek East Primary Effluent Pump Station discharges to a common header with control valves that are mostly closed. By implementing programming changes this can be controlled to open the valves, reducing pressure loss in the system and saving an estimated 250,000 kWh/yr ($15,000/yr).

Through creative, thoughtful and proactive steps, CWS is turning back the kilowatt dial, saving ratepayer dollars, shrinking our carbon footprint and engaging staff in process improvement.

a. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
    - **Organizational culture:** The Energy Team is characterized by a spirit of positivity and a commitment to engaging employees regardless of job title, discipline, shift or geographic location. That spirit runs throughout the organization.
    - **Capital improvements:** Since 2010, CWS has prioritized more than 45 capital improvements—such as blowers, lighting and VFDs—that yield energy efficiency.
    - **Industrial energy improvement:** In 2012, staff conducted an intensive study of energy use at our wastewater treatment plants that facilitated the development of energy maps showing where energy is being consumed.
    - **Strategic energy management:** Since 2016, in partnership with Energy Trust of Oregon, we have focused on opportunities to improve energy efficiency in the daily operations and maintenance of our wastewater treatment facilities.
    - **Dedicated staff:** In November 2016, CWS hired an Engineering Project Coordinator-Energy Sustainability to provide direction, coordinate events, participate in incentive offerings and estimate savings achieved.
    - **Lean Six Sigma principles:** The Energy Team uses tools and approaches such as a clear team charter and a demonstrated commitment to establishing metrics, monitoring performance and correcting course as needed.

- **Team information-sharing**: The Energy Program page on our intranet is well organized, up to date and easily accessible to staff. It includes an Opportunity Register, which staff have used to make nearly 300 suggestions.
- **Engagement:** The Energy Team holds Energy Treasure Hunts where staff identify improvements such as installation of equipment timers and lighting upgrades, addressing air leaks, and optimizing processes. During our kickoff event, over 150 ideas were generated.
- **Employee communication**: Graphs, photos and articles in the employee newsletter and other organization-wide channels underscore what our energy efficiency goals are and how we're progressing.
- **External communication**: "Producing clean, renewable energy" is an accomplishment we mention frequently in public-facing channels such as annual reports, videos and community presentations.
- **Knowledge exchange**: CWS staff are eager to share lessons learned with others in the industry. For example, two staff co-presented at the Pacific Northwest Clean Water Association 2017 conference on the topic of "Developing an Energy Culture: Engagement of O&M Staff." This presentation focused on a lighting improvement project, which engaged staff with something that was tangible and related to their daily work.
- **Partnership**: The success of the Energy Team builds upon CWS' longstanding partnership with Energy Trust of Oregon.
- **Collaboration:** We host cohort events that bring together wastewater treatment plant energy teams from around the greater Portland-Vancouver area. We also are happy to help third parties tell the story, as with the recent Energy Trust of Oregon publication, "Wastewater Facilities Give Energy Costs the Full Treatment," which highlighted CWS as a utility that "has doggedly pursued energy projects since 2010, slashing its annual energy costs by more than $1.5 million."
- **Incentives:** A Goal Share program involves SMART goals that reward collaboration with cash bonuses to staff across the organization.
- **Recognition**: The Energy Team celebrates its accomplishments through an annual gathering, articles in the employee newsletter, awards and other strategies. For example, last fall a treatment plant operator received the Most Valuable Power-Saver award for suggesting the largest energy saving idea completed in FY17.

b. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
   - Commitment of leaders at all levels of the organization.
   - Dedicated Engineering Project Coordinator, who said in a recent video interview, "My mission personally is to make everyone that works at Clean Water Services aware of our energy use and how much we actually spend and how it affects our ratepayers."
   - Time for staff to participate in Energy Teams, Energy Treasure Hunts, etc.
   - Investing in capital improvements.
   - Software, such as SharePoint, Excel, PowerPoint.
   - Photos.
   - Annual financial incentive program (Goal Share) that encourages employees to optimize process and program efficiency.

c. Did you partner with other stakeholders or organizations as a part of your implementation process?
   - Energy Trust of Oregon has been a key partner with CWS since 2009 and provided more than $5 million in incentives. Monthly meetings further discussions about ongoing projects and potential new opportunities are considered.

d. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- Developing and maintaining dynamic communication channels regarding energy projects was the most challenging obstacle to the success of this program. Staff education and engagement at the onset of each project was critical to awareness of and participation in the new processes such that "old habits" did not impede implementation of efficiency measures. Making sure energy improvements were clearly communicated with staff, labeled on equipment, and/or documented in Standard Operating Procedures, sustained energy savings that were achieved from each of these projects.

e. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

   Yes. Examples include:

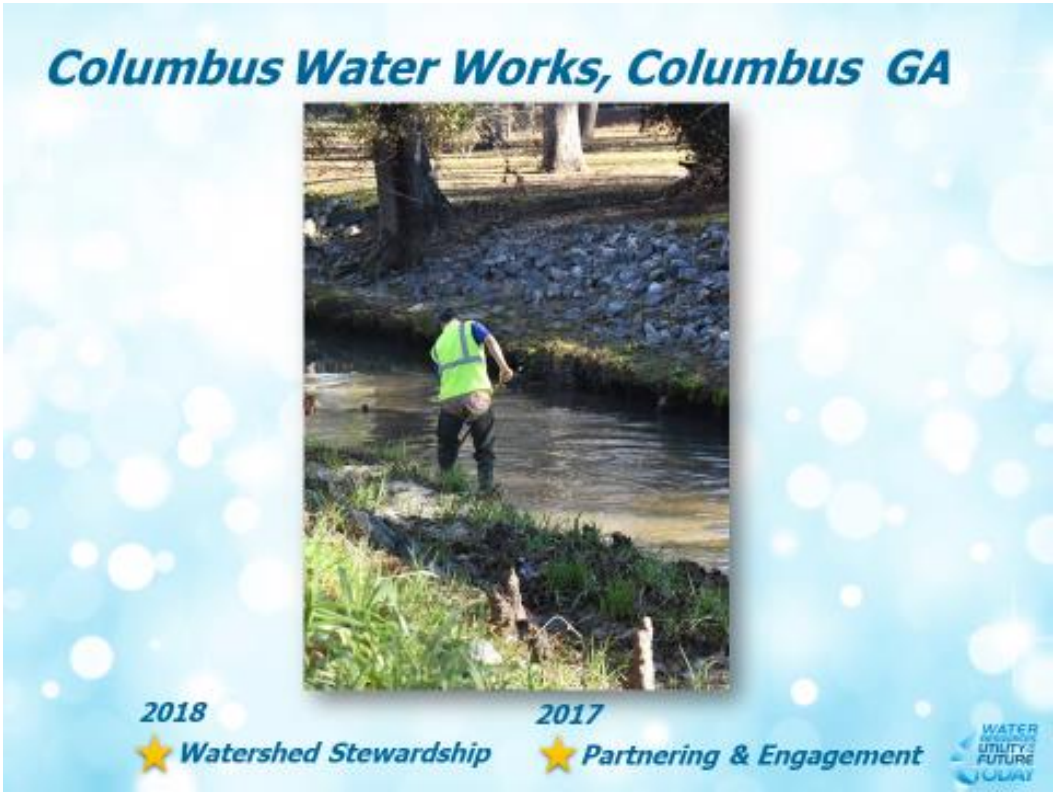
   - Installing program logic controllers on the aeration mixers at our Rock Creek facility. The new system paid for itself in five weeks.
   - Data analysis of the backwash recycle pumps at our Rock Creek facility determined that system leaks resulted in an additional 1.5 MGD being pumped. Maintenance tuning of actuators resolved the issue.

f. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

   - Energy efficiency enthusiasts can find resources through Energy Trust of Oregon (energytrust.org) and Portland General Electric Energy Classes (https://www.portlandgeneral.com/business/control-my-energy-costs/energy-classes.)

Performance Measures & Results

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
FY16 Total Energy Savings	1,000,000 kWh/yr	2,188,848 kWh/yr
FY16 Incentives Received	N/A	$232,758
FY17 Total Operations and Maintenance Energy Savings	500,000 kWh/yr	981,352 kWh/yr
FY17 Total Capital Improvement Energy Savings	N/A	935,963 kWh/yr
FY17 Incentives Received	N/A	$97,997
FY18 Total Operations and Maintenance Energy Savings	750,000 kWh/yr	Projected: 1,044,798 kWh/yr
Perform (2) Energy Audits per Year at DM and RC		>100 new project ideas / yr



Application Part 1: Background Information

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Columbus Water Works**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): **Public water and wastewater utility with one wastewater treatment plant, two combined sewer overflow facilities, and two water treatment plants.**		
Service Area (square miles): **430**	Average Annual Daily Flow or Demand (MGD): **33**	
Population Served: **255,779**		
Location		
Street Address: **1421 Veterans Parkway**		
City: **Columbus** State: **GA**	Country: **United States**	
Zip Code/Country Code: **31901**		
Utility Representative Contact Information		
Name: **Paula Goble**	Phone: **706-653-4804**	Email: **pgoble@cwwga.org**
If this application has been prepared by another entity on behalf of the utility, provide the information of the preparer below		
Name:	Title:	Contact Information (phone or email):
Current Program Members Only Fill in this section only if the utility has been recognized as a Utility of the Future Today in prior years		
In what year did the utility achieve recognition as a Utility of the Future Today? **2017**		
In which Activity Area(s) has the utility been recognized previously? Include all Activity Areas for which the utility received recognition in 2016 and/or 2017. __ Activity Area 1: Beneficial Biosolids Use X Activity Area 2: Partnering & Engagement[1] __ Activity Area 3: Energy Efficiency __ Activity Area 4: Energy Generation & Recovery __ Activity Area 5: Nutrient Reduction & Materials Recovery[2] __ Activity Area 6: Water Reuse __ Activity Area 7: Watershed Stewardship[3] (__IGP)		

Narrative: Columbus Water Works (CWW) is an organization of approximately 280 employees with widely varying skills committed to providing high quality drinking water and environmentally sound wastewater treatment to the Columbus-Fort Benning region, including service connections to Harris and Talbot Counties. CWW derives general policy guidance and rate setting from the Board of Water Commissioners of Columbus, Georgia, a five-member appointed group. CWW's president and staff are responsible for planning and day-to-day operations. CWW is dedicated to providing future generations with a legacy of responsible environmental stewardship of the middle Chattahoochee River watershed. We deliver treated water directly to our customers and we are responsible for collecting and treating the resulting wastewater before returning it to the Chattahoochee River.

The Effective Utility Management (EUM) initiative, developed by collaborating utility organizations, identifies the best management practices to promote sustainable water and wastewater systems. CWW uses the EUM initiative, its 10 attributes and five keys to management success for reviewing and developing operational strategies, goals and objectives. Strategic planning is one of CWW's means of continuous improvement in order to achieve the vision. An emphasis on strategic planning means that all team members at CWW are striving for common goals. By conducting regular assessments of strategies, goals and accomplishments, CWW ensures that our improvement efforts and business operations remain on track. Three strategic initiatives serve as the foundation for achieving the mission of CWW: The Customer Experience, The Employee Experience, and Our Environmental Focus.

CWW's vision, "Columbus Water Works is recognized by our customers and employees as providing the most caring experiences", serves as the driver for all of our operational decisions and is reflected in our five core values: Wow Customers by listening, caring, and responding to their concerns and ideas; Act with Integrity by being honest and sincere in everything we do; Trusted Community Partner by being engaged to improve the quality of life; Energize Employees by celebrating, encouraging, developing and rewarding their diverse capabilities and contributions; and Resource Protection by being an innovative leader in watershed management, protection, and education. Our core values form the foundation on which we perform our work for our customers, what we abide by. They are not bare descriptions of our work, but they underlie our work, how we interact with our customers and community partners, and how we fulfill our commitment to the community. These are the practices we strive to use every day in everything we do.

Our core values reflect our commitment and dedication to a standard of excellence that promotes honesty and transparency. We strive to ensure that our practices are dependable and trustworthy in meeting our customers' needs. This commitment is reflected in state, local, and national awards we receive. CWW is recognized in the areas of environmental stewardship, operational planning, management, water quality monitoring safety, and financial operations. By competing for awards, we strive for stellar performance in order to better serve our customers.
Using state-of-the art technology, our talented and dedicated employees work diligently to ensure the highest level of service to our customers. We continue to seek opportunities to improve our processes to increase stakeholder involvement and we recognize and value the importance of our customers' input and ideas. Being creative and flexible is a key element in order for us to successfully expand our outreach efforts, and the valuable feedback from our customers helps us to become more operationally efficient, enhance our services, improve lines of communication with our customers, and stimulate innovative ideas.

At CWW, we recognize and value the contributions of all our team members. This is reflected in our commitment to ensuring the work environment is safe, secure and positive. We provide valuable opportunities for employees to receive training, certification, leadership development and advancement opportunities. By doing so, we are able to ensure continuity in transferring job knowledge, skill, and future leadership for the organization.

In addition to our core business of providing quality water and properly treating wastewater, we share a serious responsibility for environmental stewardship. This is manifested by ensuring the health of our rivers and streams, protecting our watersheds, and using our water resources wisely by maximizing efficiency and returns.

We strive to maintain an awareness of industry research and development activities to anticipate and support timely adoption of operational improvements. Since automating our treatment facilities in the late 1990s, we have evaluated and implemented a multitude of innovative technologies to help drive a wide range of improvements in the area of

efficiency, safety and security. These initiatives support our efforts towards ensuring ongoing, timely, cost-effective, reliable, and sustainable performance in all facets of our operations.

CWW supports and provides national, regional and tri-community leadership in the areas of public education, community involvement, environmental stewardship, and economic development. Our leadership and staff are active participants on a national and regional level supporting industry and community goals and programs as keynote speakers, peer reviewers, as well as serving on local boards and agencies.

ORGANIZATIONAL CULTURE

At Columbus Water Works, we use the strategic planning process as one of our management tools to help us focus our efforts and energy to meet organizational performance goals. Our commitment to this process not only ensures all members of the CWW team are working towards the same objectives, but it allows us to continuously evaluate and assess our progress in response to an uncertain and ever-changing environment.

For CWW, the emphasis placed on strategic planning at all levels in the organization results in the highest level of quality service being provided to all customers, while at the same time, ensuring our operational activities support our purpose, vision and values. Today, our strategic direction is spelled out in strategies and objectives, which are supported by targeted measurable performance indicators.

One of the critical components of our strategic planning process is the monitoring and evaluation of the progress of the associated activities. As part of our strategic journey, the monitoring of program results is an element in our efforts to "check the sign posts" along the way to ensure that we remain on track and moving in the right direction. We solicit input and feedback from our customers, stakeholders and employees. We also evaluate and consider industry trends, as well as legislative, economic, technological and environmental concerns when developing our strategic programs. As a result, we are able to identify specific projects and activities which align with our operational direction and subsequently develop a deliberate and strategic approach to achieving these specific goals.

- Leadership proactively engaged in both internal organizational and broader external community priorities
  - These efforts include conducting periodic stakeholder interviews, online community leaders' survey, residential door hanger program, social media outreach efforts, monthly customer satisfaction surveys, and hosting internal Strategic and Master Planning work sessions.
  - Members of our leadership team are actively involved and engaged in community activities and organizations, to include "Help The Hooch" annual river clean-up; Coalition for Sound Growth, Inc.; Keep Columbus Beautiful Commission; Community Foundation for the Chattahoochee Valley; The Columbus Museum; the United Way of the Chattahoochee Valley, and many others. Our collaborative efforts and partnerships allow us to remain relevant and serve a key role in the development and implementation of community initiatives.
  - Since 2004, we have conducted periodic stakeholder interviews (2004, 2006, 2010, 2012, 2014) and community leaders' online surveys (2012, 2014, 2017) to solicit input on key issues, industry trends and significant business drivers.
  - Participants in the stakeholder interviews and surveys include our elected and appointed officials, representatives of private and public businesses, regulatory agencies and key interest groups, as well as our large regional and industrial customers.
  - The responses, comments and feedback gathered, as a result of the interviews, help us better understand our strengths, weaknesses, and opportunities for improvement.

Performance Measures and Results

Customer Satisfaction Index – This survey measures customer satisfaction and perceptions in five specific areas (1) Reliability; (2) Water Quality; (3) Value/Price;
(4) Customer Service; and (5) Information.

Measure	Targets	Outcomes

Customer Satisfaction Index Score (measures customer perceptions and expectations)	Meet or exceed an average score of 825/Fiscal Year (with a margin of error ± 25) on a range from 0 - 1000	For FY ended June 2017, we achieved an average Fiscal Year score of 867

- Workforce and leadership development program in place to assure recruitment, retention, and competency of utility staff
  - We have implemented a CWW Workforce Ready Program as an avenue to complement our current workforce through internships, co-op and apprenticeship experiences by providing learning and hands-on work opportunities for students or entry-level workers. The ultimate objective of the program is to promote the water and wastewater industry as a prominent career of choice.
  - CWW is a partner with Columbus 2025, which is a community-wide initiative to create a more competitive and prosperous region. The guiding principles of the plan are to increase prosperity, reduce poverty, and improve overall quality of life. CWW is actively involved in the strategy which focuses on aligning educational and workforce systems to create an environment where we recruit and retain a talented and educated workforce.
  - Develop and deploy to managers an annual training calendar which outlines all supervisor, leadership and mandatory training opportunities for the year, such as Annual Alcohol and Drug Awareness Training, Discrimination and Harassment Awareness Training, Financial Awareness, Retirement Transition Planning, Servant Leadership Program, and Public Speaking.
  - CWW offers a tuition reimbursement program for 100% of in-state tuition costs and 50% of books (per quarter/semester). CWW also provides full payment for participation in job-related workshops, seminars, conferences, certification preparation and testing, and other related training sessions.

Performance Measures and Results

Measure	Targets	Outcomes
Average Training Hours Per Employee	Meet or exceed the AWWA Benchmark Target of 29 (Top Quartile)	For FY ended June 2017, we exceeded the target of 29 by achieving a rate of 41 average training hours per employee
Average Emergency Response Readiness Training per Employee	Meet or exceed the AWWA Benchmark Target of 1.3	For FY ended June 2017, we exceeded the target of 1.3 by achieving a rate of 4.7 average training hours per employee
Total Turnover Rate (TTR)	Remain below the Compdata Survey TTR of 7	For FY ended June 2017, the TTR was 6.1

- Awareness and commitment to workplace safety established as a key operational expectation
  - Our safety program, a journey of continuous improvement, includes supervisory and employee training opportunities, regular communications to employees, leadership involvement, rewards and incentives for safety behaviors, implementation of an employee safety committee to review and make recommendations for program improvements, and conducting inspections and site visits on a regular basis.
  - Organization provides training in the areas of Risk Mitigation and Workers' Compensation, Defensive Driving Training, Safety (Excavation, Trenching, Confined Space, Flagger, First Aid/CPR, Fall Protection, OSHA).
  - Since 2016, CWW has been an active partner with the Water Research Foundation Collaboration efforts in the *"Development of an Ergonomics Guide through the Use of Participatory Ergonomics Team Approach at Reducing the Risk of Work-Related Musculoskeletal Injuries Among Water and Wastewater Industry Workers"*

Performance Measures and Results

Measure	Targets	Outcomes
Worker's Compensation Expenses	Remain below FY budgeted amount ($292,900)	For FY ended June 2017, total expenses was 57% of budgeted amount

Preventable Injuries	Not to exceed the industry standard (Incident Rate), calculated at 3 per FY	For FY ended June 2017, the Incident Rate was 3

- Employees engaged and consulted on new processes, innovations and designs
  - For FY ended June 2017, we focused on six strategies, with each strategy implemented and managed by individual organized teams made up of diverse groups of employees. Team membership reflected an equitable distribution of skills and expertise.
  - Beginning in July 2017, we embarked on a new journey, honing the six strategies into three. We continued to utilize the concept of employee team involvement to develop initiatives and action plans to support our Strategic Plan. Each team is charged and empowered with developing strategies to focus on issues and projects which impact the Strategic Plan. These strategies and are valuable tools for monitoring efficient and effective program implementation.
  - We use strategic benchmarking to track rapid responses to changing events and to measure our progress relative to defined strategic objectives. For FY ended June 2017, we tracked 30 operational performance benchmarks and reported them throughout the organization. Each benchmark is aligned with a specific strategic initiative and is tracked by the operational department.

Performance Measures and Results

Measure	Targets	Outcomes
Total number of benchmarks met	% of benchmarks met to equal or exceed 85%	For FY ended June 2017, 90% of benchmarks were met (27/30)

WATERSHED STEWARDSHIP

Source Water Assessment Plan (SWAP)

Columbus Water Works (CWW) has always had a philosophy of being at the forefront of rules and regulations that affect our operations. The SWAP grew out of the need to control combined sewer overflows in the late 1990s and early 2000s, to include a SWAP for several municipal utilities on both sides of the Chattahoochee River. The SWAP, developed through a partnership between the United States Environmental Protection Agency (USEPA), Georgia Environmental Protection Division (EPD), Alabama Department of Environmental Management (ADEM), CWW, Georgia Power, Mead Coated Board, Inc., (now WestRock) and other stakeholders and water purveyors, was developed in conjunction with an inter-state watershed study.

Columbus was one of the first drinking water communities in Georgia to initiate the requirements of the SWAP. In 2001, CWW and regional partners completed a Middle Chattahoochee River Watershed Study which included a Regional Source Water Assessment and Protection Program of surface water intakes for CWW, the City of West Point, the Chattahoochee Valley Water Supply District, and Harris County Water Department in Georgia and Opelika Water Works, Phenix City Utilities and Smiths Water and Sewer Authority in Alabama. CWW continues to facilitate regional source water protection practices of communicating, monitoring and delineating strategies for intake protection. CWW began updating the SWAP in November 2017 and will be complete by the end of May 2018.

Watershed Protection Plan (WPP)

CWW facilitated a stakeholder directed regional watershed study of the Middle Chattahoochee River including tributaries contiguous to the main stem from the West Point Reservoir dam down to the headwaters of the Walter F. George Reservoir. The steering committee included the GA EPD, ADEM, Georgia Power, Mead Corporation, EPA and CWW. The study was peer reviewed by the Water Environment Research Foundation (WERF) with Quality Assurance Project Planning by the EPA Office of Research and Development. The study was initiated in 1998, completed in 2001 and officially approved by EPD in May 2005 meeting the requirements under the South Columbus Water Resource Facility (SCWRF) National Pollutant Discharge Elimination System (NPDES) Permit # GA0020516.

In 2014, the GA EPD requested revisions to CWW's WPP that now includes creeks and streams within its sewer-shed. Columbus has approximately 90% of its service area provided with sewer service including portions of Fort Benning, Georgia. To comply with the above mentioned NPDES Permit and requirements of O.C.G.A §12-5-23, CWW will provide analytical, macroinvertebrate and fish data for 7 designated creek sites in Columbus and 1 creek site at Fort Benning that lies within CWW's sewer service area. This updated WPP officially started March 2018.

CWW Monitoring Program

CWW has an active water quality monitoring program and a 25-year history of comprehensive monitoring and calibrated modeling of wet weather contributions from tributaries.

CWW implemented a source water monitoring strategy for both the Columbus and Fort Benning water systems intake that includes:

- Real-time monitoring with YSI Sondes and ZAPS Technologies equipment at the intake of both facilities, facilitating early warning for intake protection from a potentially hazardous spill or water quality condition
- Daily bac-t monitoring in the whitewater river segment
- Daily monitoring at the Lake Oliver intake of CWW's North Columbus Water Resources Facility for water treatment operations
- Wastewater treatment systems monitoring
- Urban tributary monitoring and stormwater Best Management Practice for correction of impairments
- State water quality monitoring for public health and general assessment

Creek Walker Program

To reduce impacts the sanitary sewer system has on creeks and streams in Muscogee County, CWW began a new program in 2014 called Creek Walker. This group walks the creeks and streams in Columbus to ensure that the sanitary sewer infrastructure is working correctly, as well as conducting inspections of manholes, creek crossings, and sewer lines within the system. As part of the program, CWW also works with the City of Columbus inspecting part of the stormwater system and testing suspected illicit discharges into the creeks and streams. By 2015, this program led to 107 corrective actions that eliminated potential impacts to the streams in Muscogee County.

Mountain Oak Creek Grant

CWW and the Georgia Environmental Protection Division (EPD) entered into a contract for a Section 319(h) FY14 Grant – Element 17 "Development of a Nine-Element Watershed Management Plan for Mountain Oak Creek HUC # 0313000211 ". This was a 1 year contract from April 2017 through May 2018.

Mountain Oak Creek is listed for Fecal Coliform (FC) on the 2014 Georgia's 305(b)/303(d) list of streams not supporting its designated use. The designated use of Mountain Oak Creek is fishing. The objective of this project is for CWW and the Watershed Advisory Committee (WAC) to develop a nine-element WMP for the priority watershed, HUC #0313000211, which encompasses Mountain Oak Creek in the Middle Chattahoochee River. Ultimately, the goal is to de-list the creek.

This stream has approximately 5 miles of impairment and is located about 10 miles west of the City of Hamilton from Hwy 219 to Hwy 103.

The purpose of this nine-element watershed management plan (WMP) is to work with stakeholders on the maintenance of a healthy Mountain Oak Creek watershed through adoption and implementation of best management practices (BMPs), targeted water quality sampling, and community education and outreach.

CWW collected and analyzed 120 samples for fecal coliform, e-coli, dissolved oxygen, conductivity, pH, water and air temperature at the five samples sites from April 2017 to March 2018. CWW also collected twenty-two samples for 126 speciation analyses from August 2017 to March 2018.

Speciation testing provides identification for specific genetic markers to identify the potential fecal solution source. The fecal indicator bacteria for these tests are from the Bacteroides genus. Bacteroides is one of the prominent bacterial groups inhabiting the intestinal tracts of warm-blooded animals and is present in fecal contamination.

Speciation of the samples at the sites indicated that there were detectable amounts of ruminant and dog Bacteroidetes, which indicates populations of wildlife in the area. However no Human Associated Bacteroidetes was found in any of the samples.

Hydrilla and Sediment Study

The goal of this project is for CWW to collaborate with Dr. Susan Wilde, University of Georgia (UGA), Dr. Matt Waters (Auburn University), and Georgia Power to map locations with elevated nutrients/contaminants in reservoirs within the middle Chattahoochee River system including West Point, Harding, Goat Rock, Oliver, and Eufaula. UGA will investigate harmful algal bloom (HAB) dynamics in the water column and toxic epiphytic cyanobacteria Ah (Aetokthonos hydrillicola) growing on invasive hydrilla, (Hydrilla verticillata) and relative to background nutrient levels and retention time in these systems. Flow dynamics and sediment storage and movement will affect potential for HAB's, and intensity in growth of the invasive macrophyte (hydrilla) with toxic epiphytes (Ah).

The initial HAB and hydrilla/Ah boat surveys will be conducted in early September and late October using sonar bathymetry/hydrilla mapping (CI Biobase) and rake tosses to collect and quantify submerged aquatic vegetation from 3-10 boat ramps and 3-10 additional subsites within each waterbody. At targeted GIS locations data will be recorded on relative hydrilla density, water depth, plant height, and collect water quality profiles including; temperature, dissolved oxygen, conductivity, pH, turbidity, and in-situ chlorophyll/phycocyanin. Light attenuation through the water column will be measure using secchi disk transparency and Li-Cor PAR profiles. UGA will screen materials for Ah using microscopy and genetic analysis, and then divide and store samples at -20^{o}C for use in genetic analyses and toxin bioassays. Toxicity will be assessed using ELISA, PCR (toxin producing genes), HPLC (known cyanotoxins & suspect peak for novel Ah toxin.

UGA's preliminary sampling in Lake Oliver, CWW's source water lake, in August 2017, found abundant algae and cyanobacteria growing on hydrilla, but no Aetokthonos hydrillicola. Dense Lyngbya and Oscillatoria filaments were associated with the hydrilla and matted out on the surface in isolated back coves.

Auburn University will collect sediment cores from the dam areas of each system. Specific aims of the project are: 1) quantify the delivery and storage of nutrients and metals in the two reservoirs and construct a conceptual model of sediment transport between the basins, 2) reconstruct the long-term history of phytoplankton in each system to determine if eutrophication or Hydrilla occurrence is linked to sediment characteristics. To achieve these goals, Auburn will utilize paleolimnological techniques on surface sediment samples and cores. Surface sediments and sediment cores will be collected, and nutrients (C, N, P), organic matter, stable isotopes, metals (Fe, Al, Mg, Zn, Pb, Co and others), and photosynthetic pigments will be measured on the sediment samples.

Currently, the field surface sediment surveys of Goat Rock and Harding have been completed, and all sediment cores have been collected from West Point Lake (4 cores in all). All of the core samples have been run for organic matter, bulk density, C, N and photosynthetic pigments. P and other elements are being analyzed now. As for the surface samples, organic matter and bulk density for each sample have been run and are moving through the other analyses.

Educational, Outreach and Voluntary Programs

- Oxbow Meadows Environmental Learning Center, located at the southern end of the Columbus Riverwalk, includes two classroom-laboratories, an 86-seat auditorium, state-of-the-art instructional media, the National History Discovery Center, indoor and outdoor exhibits of living reptiles and fish, a stream habitat supporting various plants and animals, a pollinator garden, bee hives, and environmental art. The Center provides exhibits, displays and nature trails, and formal and informal programs about the ecology and natural history of the region. Through projects such as Adopt-a-Stream and Help-the-Hooch, CWW provides the Center with resources and

leadership in providing watershed education and preservation. CWW have recently completed an 8,500 square foot expansion of the Center.

- CWW is actively engaged in regional and tri-state water planning to include membership in the Middle Chattahoochee Regional Water Planning Council and the Apalachicola-Chattahoochee-Flint Stakeholders.
- The City of Columbus has been named a "Water First Community." This designation symbolizes the combined efforts of the private, public, and academic sectors to promote environmental education and preserve our water resources.
- The City of Columbus is a WaterSense partner, part of a voluntary partnership program sponsored by the USEPA. WaterSense seeks to protect the future of our nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices. Products and services identified as WaterSense make it easier for customers to make selections that will save water and protect the environment.

Performance Measures and Results

- Continuous monitoring through the use of strategically located YSI sondes and leading edge technology of ZAPS provides CWW with the capability to oversee 25 water quality parameters in real time 24/7. This technology not only helps the plant operators produce high quality water using fewer resources, but it also gives CWW an early warning system when something may be coming into the plant.
- Routine monitoring of Lake Oliver and Lake Harding, a larger impoundment upstream, provides CWW with a good profile of water quality in the lake. Sampling is done during dry and wet weather events and includes metals, organics, and bacteria.
- CWW also monitors the impoundments twice per month from a boat utilized to pull samples for bacterial and chemical analyses. These sampling events allow CWW personnel to monitor water quality health on a routine basis and ensure that land use has not changed dramatically.
- Continuous monitoring of nutrient loads give CWW a good indication of possible issues that may arise from algae growth. As cyanobacteria have become an important issue, CWW has been monitoring for algae and byproducts of algae growth for several years. Tests conducted in the lab include GC/MS for MIB and geosmin, Abraxis for cyanotoxins, and high definition camera microscopes to identify species of algae. CWW has finished the second year of a three-year study to look at precursors and climate conditions along with speciation of types of algae seen in our source water to develop a predictive model to determine when harmful algae blooms may occur.

Utility Description (combine all plants if a multi-site system)	
Utility Name: **DC Water**	
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Water distribution, sewer collection and wastewater treatment (regional wastewater treatment)	
Service Area (square miles): 725 square miles	Average Annual Daily Flow or Demand (MGD): Avg 100 MGD for water distribution. Built for avg flow of 384 mgd wastewater treatment, w/ 1 bgd peak treatment.
Population Served: Drinking water: 680,000 residents, 700,000 employees and millions of visitors each year. Wastewater treatment: All of the above, plus wholesale customers in Loudoun and Fairfax counties in Virginia and Prince George's and Montgomery counties in Maryland, for a total of more than 1.6 million.	
Location	
Street Address: 5000 Overlook Avenue, SW	
City: State: Washington, DC	Country: USA
Zip Code/Country Code: 20032	
Utility Representative Contact Information	

Name: Pamela Mooring	Phone: 202-538-2773	Email: Pamela.Mooring@dcwater.com
If this application has been prepared by another entity on behalf of the utility, provide the information of the preparer below		
Name:	Title:	Contact Information (phone or email):
Current Program Members Only **Fill in this section only if the utility has been recognized as a Utility of the Future Today in prior years**		
In what year did the utility achieve recognition as a Utility of the Future Today? 2016, 2017		
In which Activity Area(s) has the utility been recognized previously? Include all Activity Areas for which the utility received recognition in 2016 and/or 2017. _X_ Activity Area 1: Beneficial Biosolids Use __ Activity Area 2: Partnering & Engagement __ Activity Area 3: Energy Efficiency _X_ Activity Area 4: Energy Generation & Recovery __ Activity Area 5: Nutrient Reduction & Materials Recovery __ Activity Area 6: Water Reuse __ Activity Area 7: Watershed Stewardship (__IGP)		

Watershed Stewardship

OVERVIEW PARAGRAPH

DC Water has undertaken numerous robust programs to protect the District's watersheds/sewersheds and the Chesapeake Bay. The largest is a group of projects that together are called the DC Clean Rivers Project. There are additional initiatives that serve to protect the environment through stream restoration and climate resiliency planning, as well as the beneficial reuse of biosolids in environmental projects.

DC Clean Rivers Project

More than a dozen projects comprise the overall DC Clean Rivers Project, a $2.7 billion initiative to reduce combined sewer overflows (CSOs) to the District's three waterways (Anacostia and Potomac rivers and Rock Creek) by 96 percent overall and by 98 percent on the Anacostia River alone.

During dry weather, sewage from homes and businesses is conveyed to the District's wastewater treatment plant at Blue Plains, where the wastewater is treated to remove pollutants before being discharged to the Potomac River. During certain rainfall conditions, the capacity of a combined sewer (both sewage and runoff in one sewer pipe) may be exceeded. When this occurs, the excess flow, a dilute mixture of wastewater and stormwater runoff, is discharged to the Anacostia River, Potomac River, Rock Creek and tributary waters. The Federal Clean Water Act allows CSOs, but the Environmental Protection Agency (EPA) requires communities to develop a plan to address overflows.

When the project began, during years with average rainfall, DC Water estimated that combined sewers overflow into the Anacostia and Potomac rivers about 75 times annually, spilling nearly 1.3 billion gallons into the Anacostia and 640 million gallons into the Potomac. Rock Creek averages 30 CSO events and 49 million gallons of overflow a year.

Anacostia River Tunnel System

Four segments will ultimately form the complete 13-mile tunnel. DC Water began by tunneling north from the Blue Plains Wastewater Treatment Plant and developed a pump station and treatment facilities at the plant.

- Blue Plains Tunnel and Anacostia River tunnel segment- These two segments combined make up the lower half of the system. In March of 2018, a few days ahead of the consent decree mandate, DC Water turned up the

lower portion, a 7-mile segment, and began capturing combined sewage and conveying it to Blue Plains for treatment. An intensely rainy spring ensued and the tunnel…

- The Northeast Boundary Tunnel (NEBT) segment will be mined to the north and join up with the already completed First Street Tunnel to bring CSO relief upstream in the District. The preliminary work has been completed for the NEBT and the tunnel boring machine has arrived and will be assembled shortly.

- First Street Tunnel- Six years ago, DC faced a daunting challenge—heavy rains were causing serious street and basement flooding in the low-lying Bloomingdale and LeDroit Park neighborhoods. It was a problem that had existed for decades and was tied to the limited capacity of the sewer system installed in the late 1800's. Four intense storms in the summer of 2012 led to the Northeast Boundary Neighborhood Protection Project, a joint effort between the District and DC Water. One of the most significant aspects of the plan called for accelerating construction of a tunnel under First Street, NW. Construction of the First Street Tunnel (FST) is now complete. It is 2,700 feet in length and 20-feet in diameter, running under First Street, NW from Channing Street to Rhode Island Avenue, at a depth of 80 to 160 feet below ground. For now, the tunnel will function as a 9.3 million gallon underground storage tank to hold combined stormwater and sewage during rainstorms. Following each storm, it is emptied by a temporary pump station into the existing sewer system to convey to the Blue Plains Advanced Wastewater Treatment Plant for treatment. After completion of the Northeast Boundary Tunnel (NEBT) Project in 2023, the pump station will be decommissioned and the FST will then be connected to the NEBT so it may convey flows directly to Blue Plains for treatment. The project is one of the most challenging DC Water has ever undertaken, digging deep shafts in the tight confines of a historic neighborhood. It required innovative engineering and an unprecedented level of public outreach, communication and coordination with residents. Their patience and participation in regular tunnel forums helped ensure success. Their neighborhoods are now better protected than they've ever been against potentially damaging storms.

Green Infrastructure (GI)

DC Water introduced green infrastructure more than a dozen years ago at its facilities to test the practices. These practices include installing green roofs (gardens on rooftops), rain gardens, and rain barrels, using pervious pavements, removing impervious surfaces, and using other natural means to capture and infiltrate rain water. Capturing the water before it can enter the combined sewer system aids in alleviating combined sewer overflows (CSOs) in the District.

Once George Hawkins arrived as General Manager in late 2009, DC Water pursued a more aggressive green infrastructure program. This led to the eventual reopening of the 2005 consent decree and allowing for green infrastructure to be used to achieve the capture required for the Rock Creek sewershed and a hybrid of gray infrastructure (tunnels) and green to be used for combined sewage capture in the Potomac River sewershed. The Anacostia River Tunnel System was already well under way since that was the most impaired river.

DC Water built a one-acre green roof atop a drinking water reservoir at the Ft. Reno facility and another atop the Eastside Pumping Station near RFK Stadium.

In April 2013, DC Water launched the Green Infrastructure Challenge, engaging firms to design innovative green practices that absorb rain water. As part of its Green Infrastructure Challenge, DC Water awarded more than $2 million for construction of GI practices to be implemented on the 100 block of Kennedy Street NW under the Kennedy Street Revitalization Project, a partnership between DC Water, the District of Columbia Mayor's Office and the District Department of Transportation (DDOT). This project was just completed and will manage stormwater to reduce combined sewer overflows (CSOs) into the District's waterways, improve traffic and safety conditions and contribute to the revitalization of the historic Kennedy Street NW corridor from Georgia Avenue to North Capitol Street within the Ward 4 neighborhoods of Brightwood and South Manor Park.

Another project that came out of the GI Challenge is a parks project being installed on Kansas Avenue, NW & 2nd Street NW, and Kansas Avenue NW and 3rd Street NW. It is slated for completion in the fall.

Development of the National Green Infrastructure Certification Program (NGICP)

DC Water, WEF, and a group of partnering organizations from across the nation developed a program to train a skilled green workforce, help streamline the process of connecting qualified green infrastructure talent to in-demand jobs, support community-based job creation in U.S. cities, and establish national standards for professionals seeking to work on GI projects.

Those who complete the program are tested on their knowledge of GI fundamentals, construction methods, and maintenance procedures. This program provides a tremendous opportunity to reach new groups of people and to promote the implementation of GI projects and a skilled green workforce for the betterment of communities, the economy and the environment. Housed under the WEF Stormwater Institute, the NGICP was developed and implemented with the support of a growing number of utilities to help advance the program nationwide.

DC Water Pope Branch Sewer Rehabilitation and Stream Restoration Project

DC Water executed the Pope Branch Sewer Rehab and Stream Restoration project in partnership with the District Department of Energy and the Environment (DOEE). Design and construction included rehabilitation of 4800 linear feet of sanitary sewers, 300 linear feet of storm sewers, and 5000 linear feet of urban stream improvements. The sewer and storm drains were at risk of collapse due to widespread erosion in the urban stream. This erosion was undercutting the pipe and outfalls. Many of the storm drain outfalls had already collapsed into the stream.

This project was particularly challenging due to poor access to the stream and its steep side slopes. The stream runs through a fully developed neighborhood in southeast Washington, DC and is primarily situated behind homes with only a few access points. Construction required significant efforts to manage erosion and sediment deposition. DC Water constructed the sewer, and then constructed the stream leaving the stream valley appearing natural while maintaining critical engineering function of flood control, sewer asset protection, erosion prevention, and habitat protection. Stream improvements required several steep drop structures to simultaneously prevent street flooding and manage runoff down the steep side slopes and into the stream from the adjacent streets. Large boulders and large woody debris were used to create a series of step pools along the stream to promote infiltration. The pools were engineered to prevent future erosion during high flows and to support biological habitat. Because the stream channel collects runoff from a very urban area with significant impervious area the peak flows are many times higher than typical flow rates. The planting design was engineered to reduce nitrogen and phosphorous loading into the downstream Anacostia River and Chesapeake Bay.

DC Water would not normally have undertaken a project with such a focus on stream improvements, but the mission of DOEE and DC Water had so much in common that a partnership made perfect sense and provided significant cost savings. Since the channel is also in the 100-year floodplain and includes wetlands, FEMA and the US Army Corp were also partners on the project.

Environmentally Friendly and Resilient Building for Headquarters (HQO)

Construction is nearly complete on a new DC Water Administrative Headquarters Office on DC Water property in Southwest DC. As land at the Blue Plains facility has been transitioned from contractor housing to wastewater treatment processes, the need to consolidate contractors into the existing central office building at Blue Plains has become evident. DC Water sought to house the headquarters functions and bring the Customer Care and Operations Department, as well as the Emergency Command Center, from leased space into a new central building. Innovative planning for this building, situated over top of an existing sewage pumping station, highlights these attributes

- U.S. Green Building Council (USGBC) LEED Platinum office building employing innovative and modern technologies in a friendly and open work environment.
- The headquarters project captures 100% of the rainwater falling on the site and reuses it for 100 percent of non-potable purposes on-site. Extra amounts will be used for occasional irrigation during extremely dry periods. The cistern water will be filtered and lightly treated prior to reuse in a piping system separate from potable water supplies.
- Low Impact Development (LID) bioswales allow water to infiltrate on site.
- The heavily planted site reduces the heat island site relative to the existing paved condition.
- Base elevation is above the 500 year floodplain, which protects a majority of the campus from most flooding conditions.

- A separate FEMA-funded project will complete more than $1 million in flood proofing to the Historic Main Pumping Station next door.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
First Street Tunnel- design and build to mitigate flooding in Bloomingdale/LeDroit Park. Convert McMillan sand filters to store stormwater during heavy rain events.	Mitigate flooding during heavy rainstorms by storing stormwater in alternate facilities until the Anacostia River Tunnel System (the full 13.1 miles) is complete in 2023.	Some flooding still exists; however, the large-scale street flooding has been mitigated. First Street Tunnel: Complete and holds 9.3 million gallons of stormwater for flood relief. McMillan sand filters: Holds about 3 million gallons of stormwater for flood relief.
Commission lower segment of Anacostia Tunnel System.	Meet consent decree to put lower segment into service by March 23, 2018, and to capture 80% of CSOs in that part of system	Met the deadline and immediately saw benefits-exceeding targets. Please see Figure A below.
Partner to develop a training program for individuals interested in green jobs, creating a curriculum for consistency across the US.	Develop the program. Administer a pilot program in Washington, DC, among other cities. Measure and assess for further refinements.	Please see Chart B below.
Pope Branch Stream Restoration- Partner with other agencies to restore the stream. DC Water portion focuses on sewer lines that were collapsing into the stream and otherwise in need of repair.	Design and construct rehabilitation of 4800 linear feet of sanitary sewers, 300 linear feet of storm sewers, and 5000 linear feet of urban stream improvements.	Project completed in partnership with District Department of Energy and The Environment (DOEE), FEMA and the US Army Corp. Design and construct rehabilitation of 4800 linear feet of sanitary sewers, 300 linear feet of storm sewers, and 5000 linear feet of urban stream improvements.
Headquarters- plan for resiliency, especially flooding protection, since the building is on the Anacostia River.	Plan for a base above the 500-year floodplain, which protects a majority of the campus from most flooding conditions.	Headquarters was built above the 500 year floodplain.

Below is the performance of the Anacostia Tunnel from the place in service date of March 20 to June 3. The tunnel has captured about 1.3 billion gallons of CSO to date.

Note that this portion of the tunnel was designed to provide approximately 80% reduction in CSOs for ***average*** year rainfall conditions. So its performance to date has been better than expected given the extreme rain of the past couple months.

Anacostia Tunnel Performance
(March 20 – June 3, 2018)

No.	**Date**	**Rainfall, avg of 4 gages (in)**	**Volume Captured by Tunnel (MG)**	**Measured Overflow (MG)**	**% captured**
1	Mar 20, 2018	0.59”	20	0	100%
2	Apr 16, 2018	1.81”	181	10	95%

3	Apr 24-25, 2018	0.72”	23	0	100%
4	Apr 27, 2018	0.68”	45	0	100%
5	May 13-May 20, 2018	5.71”	651	4	99%
6	May 22 2018	1.05”	128	5	96%
7	May 31-Jun 1 2018	0.89”	86	4	96%
8	Jun 3, 2018	1.57”	224	89	72%
	Total	**13.02”**	**1,358**	**112**	**92%**

A. Please find below the employment statistics for Cohorts 1-4 of the National Green Infrastructure Certification Program as of May 15, 2018.

Cohort	Enrolled	Start Date UDC/WPP	End Date	Graduated	Employed
1	32	11/18/2016	1/26/2017	9	9
2	26	5/1/2017	6/30/2017	7	7
3	14	9/25/2017	12/7/2017	10	9
4	15	10/2/2017	12/7/2017	7	5
5	14	4/9/2018	5/23/2018*	0	0
6	17	4/23/2018	5/23/2018*	0	0
Total	118			33	30

*NGICP Exam dates. No further information is available at this time.\

Use of DC Water’s Class A Biosolids

DC Water’s new Class A biosolids are being used in a number of ways and through different partnerships (as outlined in previous award applications). A recent example is the removal of an asphalt parking lot on Kingman Island that was transformed into native meadow habitat with DC Water biosolids. This is one of Kingman Island’s great living learning features, making academics more engaging and fun.

a) How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph? See above.

b) What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

Obviously, these initiatives are cost- and staff-intensive. The Clean Rivers Project is projected to cost $2.7 billion when complete. To date, the investment has been close to $1.3 billion. The Clean Rivers Project alone, at its peak, employed approximately 1500 staff and contractors. In addition, support staff from Finance to Procurement to General Counsel to External Affairs, and more, all play vital roles in support.

DC Water employs about 1,100 full-time employees on staff. Add to that contractors, subcontractors and contract employees (Security, IT, etc), and the current workforce is quite large. The FY 2018 operating budget was $561.9 million and the 10-year Capital Improvement Program budget is $4 billion. DC Water sells bonds to raise capital for these large capital expenditures and has developed several innovative financing tools including green bonds, century bonds and an Environmental Impact Bond (that follows the Social Impact Bond model of paying for performance).

The costs of the program are being factored into rates and the annual rate increases are met with more scrutiny each year.

c) What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

The Clean Rivers Project tunnel segments are located deep underground across public and private property, below utilities, and below the Metro tunnels. It is precise, and at times dangerous, work and requires permits and access from many different entities. Rather than weeks or months, these projects took years to complete and caused disruption to residents. DC Water has worked with staffs from military bases and all levels of government, as well as property owners, neighborhoods, and environmentalists, providing as much in the way of public services to those affected as possible while still maintaining active construction sites.

One obstacle that is becoming more apparent to us is the rate structure that we put in place to recover the costs of the project. The burden to the ratepayers in some cases may be too great, and criticism is increasing. Presently, we are re-evaluating both the rate structure and how we communicate it.

d) Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

DC Water leverages "smart technology" for both drinking water operations and sewer collection and wastewater treatment. For the purposes of the application for Watershed Stewardship, we are limiting discussion to those technologies that protect the watershed.

Keeping costs down and maintaining asset reliability require the right information. If lacking a clear understanding of the inherent capacity of the conveyance system under various operating scenarios, the result can be unnecessary or misdirected investments without achieve the desired outcomes.

DC Water's Information Technology personnel work closely with Operations and Customer Care staffs to apply "smart technologies" for efficient and effective operation of the collection, conveyance and treatment operations in a coordinated manner to reduce and/or eliminate SSO's and CSO's. Using more advanced and distributed sensor technology that measures flow and levels, in real-time, in the conveyance systems coupled with weather data and historical condition data from Capacity, Management, Operation, and Maintenance (**CMOM**), DC Water is building predictive models of the performance of these systems both individually and as a unified whole. With these models DC Water will be able to more precisely predict the impacts of weather and other events on the performance and operations of its system in advance allowing it to proactively optimize its collection and treatment systems.

The Clean Rivers Project leverages many innovative technologies for both tunneling and green infrastructure solutions. For example, in the neighborhoods surrounding the First Street Tunnel, where the shaft and tunneling was completed in residential areas very close to historic homes, ground freezing was used. It is an innovative method used to support open ground excavations by protecting adjacent structures in a smaller construction footprint, with less dust, noise, vibration and material deliveries than other excavation support methods.

e) Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

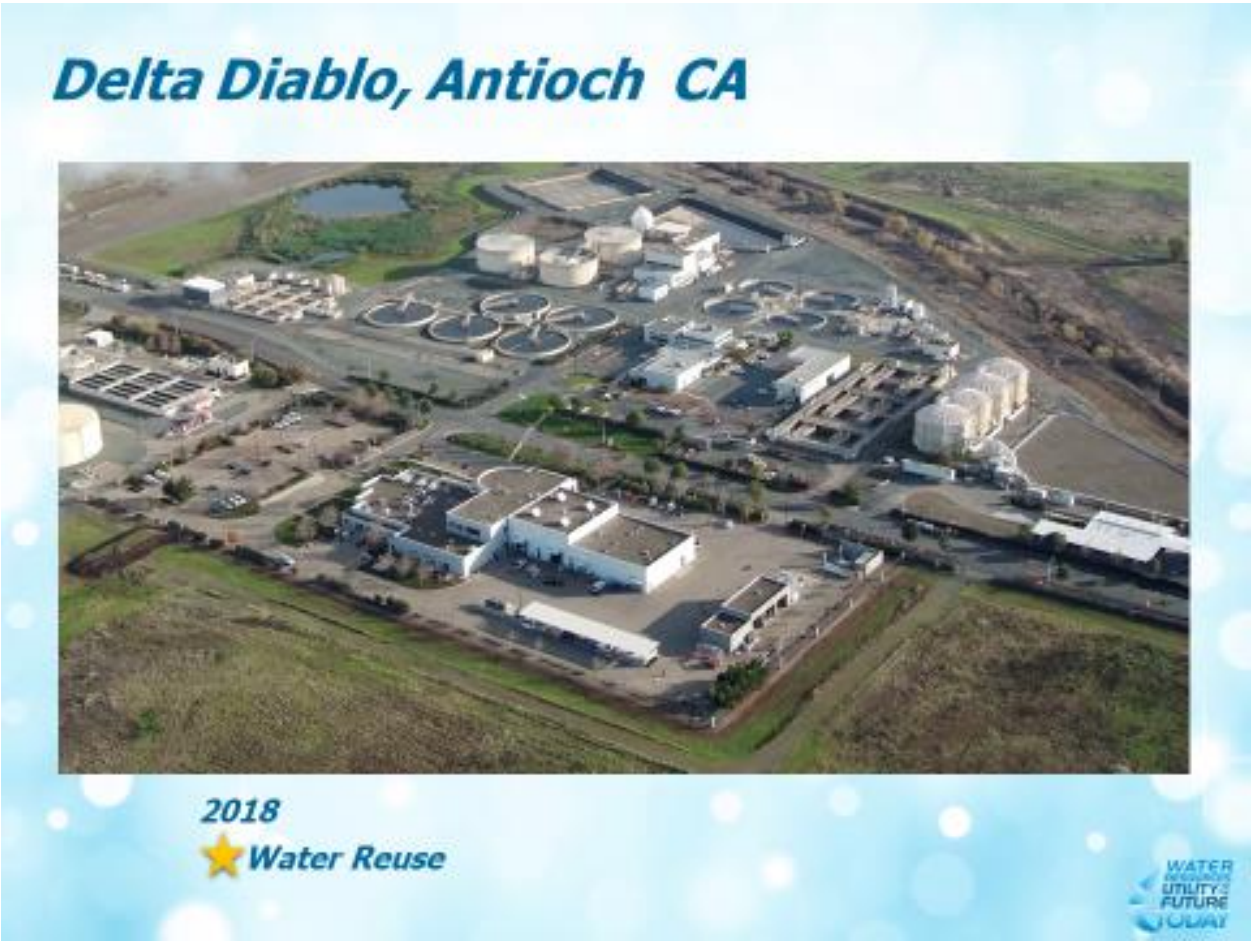
DC Water recently redesigned its website as part of a major Customer Information System overhaul. The new website has much updated Clean Rivers Project information. A robust section covers both gray and green infrastructure with a landing page here:
https://www.dcwater.com/clean-rivers-project
Subpages flow from there and cover every contract and project.

In addition, DC Water publishes twice yearly an update on the Clean Rivers Project, including news of the projects and basic FAQs about CSOs. These are posted online, sent in customer bills and sent to boat houses and marinas. The archives of these publications can be found here:
https://www.dcwater.com/publications?field_document_type_tid=54&field_document_sub_type_tid=55

The monthly (soon to be quarterly) *What's on Tap* is also sent in customer bills and covers other projects, services and information, including environmental articles.
The archives are here:
https://www.dcwater.com/publications?field_document_type_tid=54&field_document_sub_type_tid=All

DC Water's External Affairs (now Office of Marketing and Communications) works closely with elected officials and the media to inform the public about all its construction projects and environmental protections. The Outreach Team supports Clean Rivers and Engineering at community meetings and provides educational materials. The media team has secured front page coverage, with graphic, photos and a video in the *Washington Post* on the Clean Rivers Project. *USA Today* also covered the project with a two-page spread, video, photos and graphic that describe the CSO problem in very basic terms. Dozens of national, regional, local and trade publications have covered the project. Listings and links can be found here:
https://www.dcwater.com/anacostia-river-tunnel-grand-opening
https://www.usatoday.com/story/news/nation/2014/03/09/sewer-overflow-tunnel/5808615/
https://www.washingtonpost.com/local/trafficandcommuting/meet-lady-bird-a-massive-machine-digging-out-a-solution-to-dc-wastewater-woes/2014/02/15/e20b1c60-8dc3-11e3-98ab-fe5228217bd1_story.html

Please feel free to contact DC Water's Office of External Affairs at 202-787-2200 for more information about the Clean Rivers Project or other initiatives. We can direct you to the most appropriate personnel including the Director of the Clean Rivers Project, our Chief Sustainability Officer and/or our Chief, Water Quality and Watershed Management or CFO.



Utility Description (combine all plants if a multi-site system)		
Utility Name: **Delta Diablo**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): **Single plant**		
Service Area (square miles): **54**	Average Annual Daily Flow or Demand (MGD): **13.3 MGD**	
Population Served: **212,000**		
Location		
Street Address: **2500 Pittsburg-Antioch Hwy**		
City: State: **Antioch CA**	Country: **United States**	
Zip Code/Country Code: **94509**		
Utility Representative Contact Information		
Name: **Amanda Roa**	Phone: **(925) 756-1940**	Email: **amandar@deltadiablo.org**

Organizational Culture

Delta Diablo (District) is a California special district, located approximately 35 miles northeast of San Francisco, that provides water resource recovery services for over 212,000 customers in the cities of Antioch and Pittsburg, and the unincorporated community of Bay Point. These services include wastewater conveyance and treatment, recycled water production and distribution, energy conservation and production, beneficial biosolids reuse, pollution prevention, street sweeping, and household hazardous waste collection. As a "Utility of the Future," the District embraces innovative approaches and sustainable solutions to benefit the environment, maintain reasonable rates, and serve as responsible stewards of the public's resources and trust. The District's progressive, continuous-improvement based organizational culture has provided the foundation for achieving the following key outcomes:

- Regulatory Compliance: The District received the NACWA Platinum 14 Peak Performance Award in recognition of its exemplary record of 14 consecutive years without an NPDES permit violation.
- Water Recycling: The District produces 6.5 MGD of recycled water, which is nearly 50% of the daily average plant flow of 13.3 MGD. This valuable resource is used to offset potable water demand at two large power plants, and local golf courses, parks, and schools. The District has produced over 38 billion gallons of recycled water over the past 16 years.
- Energy Management: The District generates sufficient biogas to meet 70% of plant demand via anaerobic digestion of wastewater sludges and fats, oils, and grease (FOG) at its on-site cogeneration facility. In addition, the District is actively identifying energy conservation and efficiency opportunities through the U.S. Department of Energy's Superior Energy Performance pilot program (one of eight participating agencies in the nation).
- Biosolids Reuse: The District beneficially reuses 100% of the 3,300 dry tons of nutrient-rich biosolids produced each year with nearly 90% applied to land as a soil amendment to promote healthy soils and carbon sequestration.
- Household Hazardous Waste (HHW) Collection: Developed in partnership with local cities, the District owns and operates a regional HHW collection facility. Approximately 525 tons of HHW and 150 tons of electronic waste are delivered by 14,500 vehicles each year with nearly 70% of the HHW reused or recycled.
- Community Engagement: Through its industry-leading public outreach program, the District has embedded itself in the local community by hosting plant tours, speaking at local community group events, conducting outreach on key pollution prevention initiatives, and developing relationships with local schools and colleges to increase awareness and boost interest in the wastewater industry.
- Industry Leadership and Recognition: The District continues to lead the Western Recycled Water Coalition, a large regional collaboration group that advocates for funding and legislative support at the federal and state level, while also actively supporting the Bay Area Biosolids Coalition. Since 2010, the District has received more than 25 prestigious awards in a broad range of categories. Highlights include the 2016 East Bay Economic Development Alliance's Innovation "Catalyst" Award and the California Water Environment Association's "Treatment Plant of the Year (medium)" Award in 2012 and 2016.

The cornerstone of these achievements has been the District's commitment to cultivating an environment that promotes employee engagement, recognition, and development, while actively promoting innovative and continuous-improvement based approaches at all organizational levels. As an agency with 80 staff members, the District relies heavily on its employees to drive improvement by learning from mistakes and adapting work processes, remaining open to change, and engaging with peer agencies on best practices.

Employee Engagement: Through extended engagement with staff, the District established its Core Values—Integrity, Teamwork, and Trust—with associated positive behaviors (e.g., "Collaborate to Achieve a Common Vision", "Encourage and Embrace Diverse Points of View", "Celebrate Our Success and Achievements"). The District has established a Strategic Plan through direct engagement with the Board of Directors, management team, and staff that includes vision and mission statements and specific strategic goals in the following categories: Financial Sustainability, Leadership, Operational Excellence, Workplace Innovation, and Stakeholder Engagement. Key strategic goals that underscore the District's commitment to driving organizational improvement, collaborating with regional partners, embracing innovative approaches, and developing staff are highlighted below.

- Optimize business and operational practices
- Lead and promote local, regional, and national collaboration to advance wastewater resource recovery

- Partner with local government and the business community to support and enhance economic vibrancy in the region
- Foster a culture of innovation to improve the environment, benefit our customers, and/or advance the industry
- Develop future leaders
- Nurture a productive and motivated workforce

In order to maintain a strategic focus and strong employee participation, staff is directly engaged in developing Strategic Business Plan Initiatives each year. These initiatives challenge the "status quo" and current business practices and allow staff to bring forward new ideas and approaches with direct ownership and engagement. Key examples include increasing use of information systems technology to improve organizational efficiency, identifying innovative treatment process control and monitoring systems, and developing a strategic communications plan to guide community engagement efforts.

In addition, the District is planning to conduct an employee survey to identify opportunities to improve organizational communication and engagement (e.g., peer-to-peer, supervisor-employee, management-staff), which confirms management's commitment to enriching the experience of every employee at the District. Numerous communication methods are employed to share key activities and updates with staff, including employee newsletters, regular "all-hands" meetings, and broad email communications from the General Manager highlighting key accomplishments, outstanding teamwork efforts, and Board meeting outcomes.

Employee Recognition: The District acknowledges staff efforts through multiple employee recognition events throughout the year and an Employee Recognition Awards program that recognizes outstanding team accomplishments, as well as individual achievements for "Outstanding Innovator", "Customer Service Pro", "Go the Extra Mile", "Leadership", and "Hall of Fame". Celebrating successes, learning from "failures", and supporting new ways of thinking are hallmarks of the key communication themes during these events.

Employee Development: In addition to actively promoting staff development through technical training, industry conferences, seminars, webinars and a tuition reimbursement program, the District has implemented the following key initiatives in response to employee interest and needs:

- Supervisory/Management Training: As part of its commitment to developing future leaders, the District began offering leadership training to *all* staff versus the historical practice of managers and supervisors only. In 2016, a multi-disciplinary team was used to develop a formal Professional Development and Leadership Program to provide customized training needs, while leveraging existing regional staff development programs. The result was a partnership with the Public Utilities and Waterworks Management Institute that has yielded 46 and 15 staff members completing the basic and advanced leadership training programs, respectively.
- Communications Training: In 2017, the District provided a 3-day training course to all members of the management and supervisory team, entitled "Building Better Work Relationships: New Techniques for Results-Oriented Communication," which included core themes of self-awareness, emotional intelligence, conflict resolution versus avoidance, and clearing relationship residue. Based on the feedback from attendees and staff interest, this training has also been provided for all staff with 42 employees completing this specialized training to date.
- Succession Planning: Like many other agencies, the District is experiencing a wave of retirements and competition for limited resources to fill key positions. In response to these workforce challenges, the District developed a robust succession planning strategy last year that is founded on employee engagement to identify critical positions, support staff development to improve candidacy for future promotional opportunities, develop knowledge retention plans, and plan for streamlined recruiting efforts.

In addition, the District is very proud of its longstanding recognition that providing support for an Employee Wellness Program is essential to job satisfaction, productivity, and personal development. This incentive-based program rewards healthy behaviors and activities while providing a teamwork-based support structure.

Closing: Delta Diablo continues to focus on establishing an even more successful organizational culture in support of its vision to "be a national leader in wastewater resource recovery." In transforming wastewater into valuable and limited resources—recycled water, energy, nutrient-rich biosolids—the District has affirmed its commitment to acting and

behaving like a “Utility of the Future” that serves as a well-respected and managed agency in the local community. Earlier this year, the Board of Directors approved a formal Sustainability Policy that will help guide consideration of environmental, social, and economic issues in future decision making. The District continues to embrace innovative projects, including a groundbreaking $30 million food-waste-to-energy project via a public-private partnership with a local waste hauler that would produce sufficient biogas to meet 280% of plant power demand, reduce discharge of nutrients to receiving water, and provide a long-term revenue source to stabilize future rate increases to benefit our ratepayers.

Water Reuse

Delta Diablo has achieved remarkable success in the recycled water arena with over 38 billion gallons produced and distributed to customers since the program’s inception in 2001. The District operates a Recycled Water Facility (RWF) that produces an average of 6.5 MGD of disinfected tertiary-treated flow, which represents nearly 50% of the annual average daily plant flow of 13.3 MGD. During summer months and peak demand conditions, the District frequently recycles 100% of the plant influent flow. This valuable resource is used to offset potable water demand and increase water supply reliability during drought conditions, while reducing discharge of secondary effluent to the Sacramento/San Joaquin Delta. Approximately 90% of the recycled water is provided to two large power plants operated by Calpine (Los Medanos Energy Center, Delta Energy Center) with the remainder used locally for landscape irrigation at two golf courses, twelve parks, and two public schools in the cities of Antioch and Pittsburg. Following continued expansion of the originally-installed system, recycled water distribution infrastructure now includes three storage reservoirs, two pump stations, and over 13 miles of recycled water distribution pipelines serving 21 metered sites. Approximately $25 million has been invested in the recycled water production and distribution system following initial construction. In 2016, the District received the Governor’s Environmental and Economic Leadership Award for sustainability, and was specifically recognized for its leadership in water recycling.

Key Practices, Activities, Programs: A summary of key practices, activities, and programs that the District uses to manage this key resource recovery focus area is provided below.

- The RWF was planned, designed, and constructed under a public-private partnership in which Calpine constructed the facility with District financing under a combination of grants and low-interest loans. The District assumed operations under a turnkey approach with Calpine agreeing to pay for capital and O&M costs with guaranteed rights to up to 12.5 MGD of recycled water for its cooling tower applications.
- The District has heavily relied on federal and grant funding support to implement construction of the recycled water production and distribution system infrastructure.
- A Technical Advisory Committee (TAC) was formed comprising representatives from the District and Calpine to negotiate the initial Supply and Return Agreement, resolve facility startup issues, and address water quality issues.
- The District develops recycled water rates based on estimated capital and O&M costs on an annual basis with review and approval by the TAC prior to adoption by the District’s Board of Directors.
- Although the original facility was constructed to provide recycled water to the two large power plants, significant investment has been made to expand recycled water use to better utilize the RWF’s available “shoulder capacity”.
- In 2011, the District’s Board of Directors adopted Recycled Water Guidelines to provide a framework for short- and long-term expansion of recycled water production and delivery throughout the service area. The goal is to match supply and demand to maximize recycled water utilization, while considering seasonal and diurnal variations.
- In 2012, the District completed a Recycled Water Master Plan that included market assessments, a determination of water quality applicability, and phases project recommendations. Key recommendations include required infrastructure upgrades to further expand recycled water use and potential production of high-purity water via microfiltration and reverse osmosis.
- In 2015, the District implemented a pilot residential recycled water fill station program during peak drought conditions. Approximately 482 residents were trained on recycled water use during the initial year, which allowed them to use recycled water to maintain gardens and lawns during mandatory water restrictions. The fill station was a tremendous opportunity to educate residents on recycled water and greatly advanced the acceptance of its use within the community.

- The District is currently conducting a joint pilot-scale evaluation of the Zeolite-Anammox process with Calpine to evaluate applicability relative to removing ammonia from return flows and the District's sidestream flows at its water resource recovery facility.
- The District continues to partner with neighboring and regional agencies to develop water reuse projects and initiatives, including a brackish water desalination facility with the City of Antioch, a potential regional recycled water distribution system, and future direct potable reuse options.
- The District is currently leading the Western Recycled Water Coalition, described further below.

Question & Answer

a. The public-private partnership with Calpine was heavily driven by a state mandate prohibiting use of potable water for cooling tower applications. This provided Calpine with a huge incentive to negotiate agreements with the District to facilitate construction of two large power plants in the area. Within two years, the District and Calpine agreed to terms on a deal structure and lease agreement, negotiated applicable contracts, obtained water purveyor rights from the local water district, obtained regulatory approval, and designed, built, and started RWF operations. The District has worked collaboratively with Calpine over the years through the TAC to resolve facility operational issues.

b. The District's recycled water program is supported by a 2.5 full-time equivalent staffing level in the Operations and Maintenance Divisions. These staff members are responsible for operations and maintenance of recycled water production and distribution facilities, as well as the coordination of program services for existing and future customers.

c. The design and construction of the District's RWF was a public-private partnership between the District and Calpine. The two parties worked together extensively to craft development, warranty, and lease agreements, as well as an agreement for the purchase and return of recycled water. Calpine then constructed the RWF and dedicated it to the District for ownership and operation.

d. The most critical obstacle in the development of the recycled water program was and continues to be funding for capital costs. While the initial RWF construction was handled through the public-private partnership, expansion of the program and system continues to be a challenge. A key to overcoming this challenge is described below.

Delta Diablo's culture promotes partnerships and collaboration. One prime example of the District's leadership and commitment to partnerships and collaboration is its continued role as lead agency and Executive Director for the Western Recycled Water Coalition (WRWC), which is focused on advancing recycled water development throughout the West. Members include cities, districts, and investor-owned water utilities developing recycled water projects that will provide sustainable water for various uses in member communities. Originating as the Bay Area Recycled Water Coalition in 2008 with seven members, the coalition continued to grow and expanded beyond the San Francisco Bay Area in 2013 to California's Central Valley and Central Coast, resulting in a name change to the Western Recycled Water Coalition. In 2015, the WRWC expanded beyond California to Hawaii, and currently has 18 active members.

The WRWC is unique in that members collaborate regionally, rather than compete individually for funding, with all projects being equally supported and prioritized based only on readiness to proceed. The original members secured $35 million in federal funding which was leveraged with over $105 million in local and state funds to construct eight recycled water projects with an estimated yield of 35,000 acre-feet per year (AFY). Members also secured $3.4 million in federal planning funding which provided a 50% cost share for 14 new projects to prepare recycled water feasibility studies. Once constructed, these 14 new projects will yield an estimated 100,000 AFY.

e. The District is utilizing automatic meter reading (AMR) technology and a supervisory control and data acquisition (SCADA) system as "smart" information technology to support efficient and effective delivery of recycled water services. In addition, the SCADA system supports reliable production of recycled water that consistently meets

all permit requirements. The District is currently evaluating advanced, real-time monitoring of various distribution system parameters to optimize operations and associated energy usage.

f. More information on the District's recycled water program may be found on the District's website at: https://www.deltadiablo.org/services/recycled-water and https://www.deltadiablo.org/projects-innovations/regional-partnerships/western-recycled-water-coalition

Performance Measures & Results

Measure	Targets	Outcomes
% of Effluent Recycled	100% of average dry weather flow	100% is frequently achieved during summer months on peak demand days; continuing the goal to increase use without curtailment.
Number of Regulatory Compliance Permit Violations	Zero	Zero permit violations have occurred at the RWF since facility startup.
Maintain Reasonable Recycled Water Rates	Significantly below comparative potable water and raw water cost alternatives	Proposed rates for FY18/19 are 26% and 65% of potable and raw water rates, respectively.
% of Flow to Large-scale Users (to maintain financial feasibility associated with RW distribution)	100%	All flow is provided to power plants, parks, golf courses, and schools.

Organizational Culture

The Evesham Municipal Utilities Authority (EMUA) takes tremendous pride in the organizational culture that has been established through a commitment to achieve key organizational goals by working to harness the power of employee engagement. The leadership of the EMUA creates an environment where the pursuit of organizational objectives parallel employee enrichment goals.

The EMUA's strategic organizational focus centers on maintaining and empowering the dedicated and qualified workforce. EMUA employees operate in a collaborative workplace that promotes creative problem-solving in service of the mission of the Authority. This attitude is prevalent in all the of the EMUA departments, where employees take a personal interest in the continued improvement of the performance of the organization.

This collaborative environment is sustained by integrating organizational communications systems designed to make employee participation simple for personnel in any position – whether they spend their time in the field or the office. Digital suggestion boxes are available for on-site feedback and EMUA leadership engages in personal follow-up on ideas and recommendations. During the development of new processes, the EMUA seeks collaboration between front-end developers and end users of the system in order to take advantage of the institutional knowledge and creativity of the professionals at all levels.

In order to maintain this level of involvement, the EMUA promotes educational opportunities and employs learning-based career roadmaps. A broad reimbursement program allows the employees to work toward higher licensing while simultaneously increasing their current contributions. This program not only encourages current employees to pursue further positions within the EMUA, but it serves as an attractive feature when recruiting new talent. Along with frequent

in-house training, the employees are provided with numerous opportunities to move their career further and contribute more in their present capacity at the EMUA.

In addition to continued professional education, the EMUA conducts a complete safety training program that equips every employee with an awareness and commitment to workplace safety, as defined by the EMUA as a key organizational expectation. The EMUA routinely meets and exceeds the safety training standards set forth by the joint insurance fund, and regularly achieves workplace safety recognition by accomplishing incentives designed to enhance employee awareness of workplace safety procedures.

The EMUA communications capabilities are not only an internal priority, but a broader external mission as well. The EMUA promotes a customer-service focus that addresses community values and needs. Customers are given avenues to engage with the Authority through multiple available channels. One such channel is the EMUA community involvement initiatives. The Authority is a prominent figure during community events, and acts as a primary sponsor for the largest community event in Evesham Township. These events allow the EMUA to engage the residents in a variety of ways and provide the customers with an easy way to form a relationship with their water and sewer utility. Taking strong actions in this area serves to maintain the image of the EMUA as an important and accessible member of the community.

The culture established by EMUA leadership is one of organizational sustainability which serves to address the needs of the future – now.

Partnering & Engagement

The Evesham Municipal Utilities Authority has made an effort to further solidify itself as a visible staple of the community. The EMUA participates in nearly all Evesham Township events in order to remain a familiar face to the residents. During the largest event – Evesham Township's "Harvest Festival" – the EMUA partners with the New Jersey Water Environment Association to put on an elaborate groundwater contamination display. Along with the display, the Authority gives away a package that includes bio-degradable flower pots, compost, and marigold seeds. Additionally, residents can stop by any event to pick up complimentary toilet leak detection packs and literature on conservation.

The EMUA funds and publishes an annual calendar that is distributed to all Evesham Township Residents. This calendar includes all relevant contact information for any township department and applicable dates of important township happenings. Each year, Authority personnel partner with township employees to compile all of the required information for the following year's calendar. Residents have come to expect the calendar each year and it has become a great way to promote community awareness and involvement.

In 2015, the EMUA took the leap into the world of social media. The use of the Facebook and Twitter platforms has allowed the Authority to more effectively communicate utility news to a larger number of residents than ever before. Using this new audience, the EMUA regularly produces unique content designed to engage the community in a variety of innovative ways.

An example of this unique content is a live hydrant flushing map that was developed in 2016. This is a GIS– based plugin that is embedded in the website, allowing residents to follow the EMUA flushing progress in real-time as field employees complete the digital paperwork associated with the hydrant flushing process.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

- Support from executive leadership and the board of commissioners is instrumental in enabling the organization to take this approach to customer service and community involvement. The enthusiasm for these areas starts at the top and sets the tone for the employees developing and executing these programs.
- By providing a level of autonomy to the employees directing these initiatives, leadership has helped inspire the hands-on personnel to take a personal approach to these programs. This has resulted in the programs remaining authentic through an organic, creative approach.

- The close-knit nature of the community creates an atmosphere of neighborly appreciation, which results in the EMUA and township departments working hand-in-hand to implement these programs.
- Close attention to spreading awareness of these programs through digital and traditional means has helped grow interest and attendance in the events.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

- The EMUA spends approximately $15,000.00 on the township calendar each year, and $7,500.00 on the Harvest Festival, not including manpower.
- Multiple employees volunteer to work each of these events, and any overtime costs for the workforce are approved for these programs.

Did you partner with other stakeholders or organizations as a part of your implementation process?

- The EMUA works directly with the township on the calendar and Harvest Festival. Additionally, partnerships have been developed with the Evesham Environmental Commission and the Evesham Green Team for specific events.
- The Authority lends significant support to multiple township events which the EMUA is not directly involved. The Authority donates water and manpower to multiple township happenings throughout the year.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

- Being efficient with the budget and maximizing the effectiveness is a continual challenge that the EMUA practices every day, not only with these events but as an overall organizational strategy.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

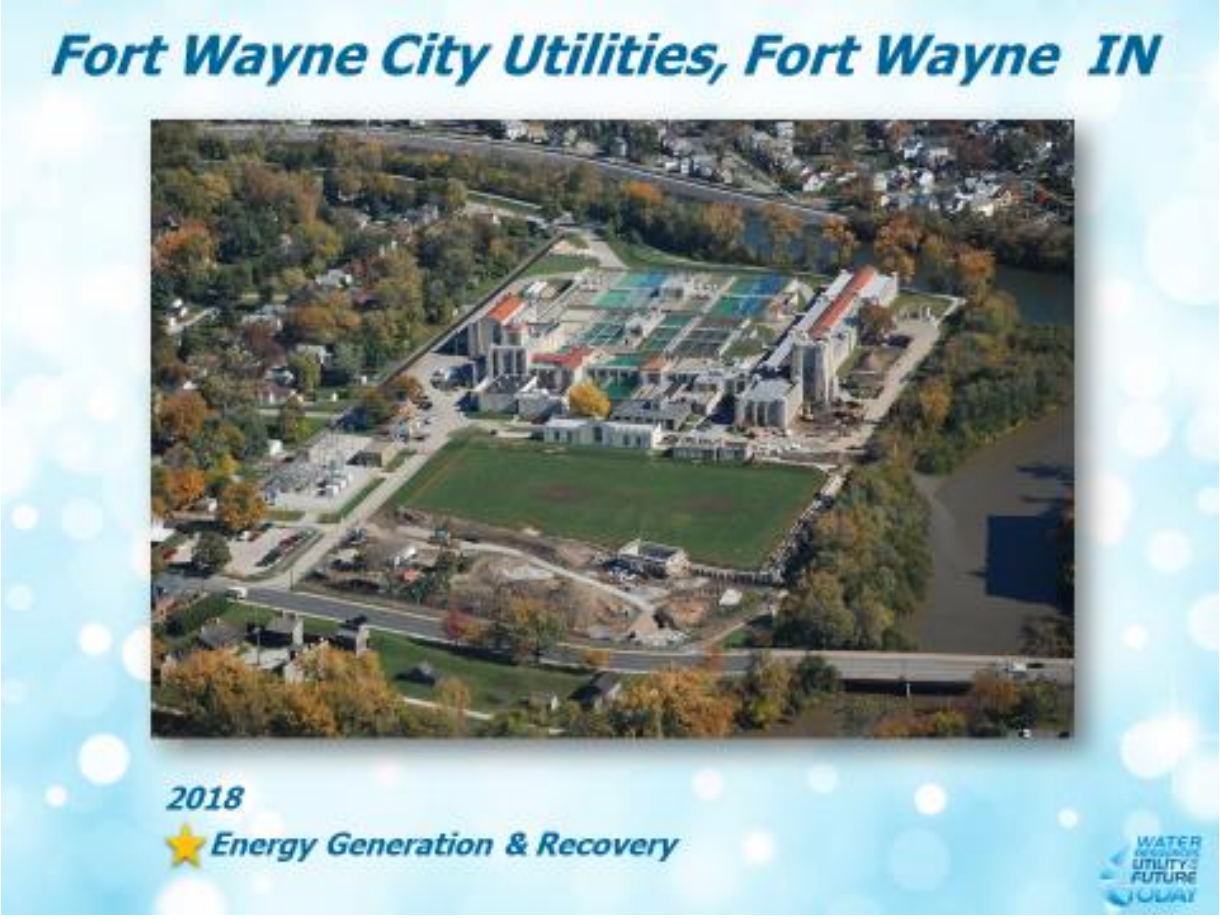
- The social media platforms have greatly enhanced the ability of the EMUA to transmit the goals of these programs through the organization and the broader community. In addition, the Authority has taken advantage of accessible video production techniques to help supplement the physical display at the events.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

- More information can be found at the following web locations:
    - www.eveshammua.com/education/
    - Facebook.com/eveshamwater
    - Twitter.com/eveshammua
    - www.eveshammua.com/flushing/

]

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Community Engagement	New communication channels between the EMUA and the community	Feedback from residents through new social media platforms
Public Awareness	Increased understanding of the role of the EMUA	Receiving 2018 AEA Wave Award for "Public "Outreach." Becoming a more valued and visible member of the community
Operational Efficiency	Continually expand on goals that improve organizational culture.	Receiving 2016 AEA Wave Award for "Best Management Practices." Increasing operational efficiency and employee engagement.



Utility Description (combine all plants if a multi-site system)		
Utility Name: Fort Wayne City Utilities		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Single plant		
Service Area (square miles): 178.62 square miles	Average Annual Daily Flow or Demand (MGD): 47.6 MGD	
Population Served: 290,000 Retail and Wholesale		
Location		
Street Address: 200 E. Berry St., Suite 270		
City: Fort Wayne State: IN	Country: USA	
Zip Code/Country Code: 46802		
Utility Representative Contact Information		
Name: Ashley Faurote	Phone: 260-427-8587	Email: ashley.faurote@cityoffortwayne.org

Organizational Culture

Fort Wayne City Utilities (City Utilities) is a regional utility, owned and operated by the City of Fort Wayne, Indiana, providing water, wastewater, and stormwater services to its customers. Fort Wayne is Indiana's second-largest city and serves as the heart of the Northeast Indiana economic region. City Utilities serves a population within the Fort Wayne city limits and outside the city limits. In addition, the utility provides wholesale water and sewer treatment services to several surrounding communities.

In 2013, using the Effective Utility Management Primer as a guide, the executive leadership assessed the organization with respect to the Ten Attributes. Management drafted vision and mission statements and a brand essence, and then expanded the effort to obtain input from department heads, employees and an outside stakeholder group. We converged on three high priority areas to pursue: Customer Service strategies (Short-Term), Operational Excellence strategies (Mid-Term), and Competitive strategy (Long-Term).

In 2017, we engaged a strategic planning consultant to assist the executive leadership team by bringing a broad, external perspective to create a comprehensive strategic plan. The document includes recommendations to guide key policy, facility, personnel, training, and resource allocation decisions, and will be used to track progress toward established goals, objectives, and priorities for the next five years.

The Strategic Plan that resulted from this process identified six strategic initiatives:

- Human Capital Development
- Community and Employee Engagement
- Customer Service
- Technology
- Affordability and Cost Management
- Environmental Stewardship and Conservation

Efforts already underway in some of these six initiative areas are highlighted below and demonstrate City Utilities' organizational culture.

We provide a continuous learning environment where staff are given opportunities to expand their knowledge base. A culture of career development exists. Internal promotions are frequent and succession planning is encouraged. All employees are offered opportunities to attend professional conferences and training courses. In-house training sessions are led by staff, suppliers, and manufacturers to provide instruction on topics such as new products, software, design standards, proactive maintenance, rules and regulations, and City Utilities' Project Management and Information System (PMIS) to name a few. Outside consultants provide training that is recognized by the Indiana Professional Engineering Licensing Agency for professional development hours. These hours help staff who hold P.E. or other certifications to maintain licensing by including topics such as Indiana law and ethics. Staff are also encouraged to participate in webinars on a wide variety of technical topics provided by WEF, APWA, AWWA, and other utility professional organizations.

City Utilities operates with cross-functional collaboration and workforce flexibility among all five operational departments. Employees take great pride in serving customers by providing quality services, and many have taken on greater responsibility for innovative and creative problem solving in recent years. As a municipally-owned utility, staff often work with other City divisions such as Public Works, Public Safety and Community Development to share ideas or work toward problem resolution.

The engineering department has developed a pipeline of future employees by growing a successful internship program. In the past 17 years the program has expanded from just two summer interns to 19 interns – many of whom work year-round. City Utilities partners with regional colleges to attract talent to the program. Opportunities are available for students enrolled in accredited Bachelor degree programs in the fields of Civil, Mechanical, Electrical Engineering, and Engineering Technologies to name a few. Interns assist with tasks ranging from archiving to surveying, data collection, design, and public outreach. Each manager to whom and intern is assigned ensures that the interns are performing important tasks for the utility and provides mentoring and guidance. Currently, 9 of the 36 FWCU engineering staff members began their careers in the intern program. Several more former interns now work locally with consulting firms that do regular business with City Utilities. In addition, several senior staff serve as adjunct faculty members and/or sit on Community Advisory Boards in schools of civil engineering and public administration at universities in the region.

Succession planning is a part of managers' jobs and is reviewed regularly. Successors are provided opportunities to work side by side with employees who are nearing retirement. Education and training needs are identified for those interested in moving within the organization, while employee reviews help provide feedback and assistance for career

growth. The City of Fort Wayne human resources department provides leadership training opportunities for all managers and many non-management staff. This training covers a wide variety of topics including how to give constructive feedback, being a change agent, and improving management skills.

As an organization, City Utilities is committed to on-going interaction with a variety of stakeholder groups to help ensure that our products, service levels, operations, and financial plans reflect a balance between the desires of stakeholders, our obligation to fulfill regulatory requirements, and the responsibility for stewardship of public infrastructure and the environment. City Utilities believes in building stakeholder understanding through involvement and education since informed stakeholders appear to be more satisfied and more supportive when difficult decisions are required.

City Utilities has partnered with a group of citizen volunteers known as the Utility Advisory Group for more than 20 years. The UAG is a sounding board, facilitating community conversations on utility issues and advising on rate setting and project prioritization. Members regularly bring utility concerns from their neighborhoods to the UAG meetings where general concerns may be addressed or specific issues can be discussed and forwarded to appropriate departments for investigation.

As a utility provider City Utilities takes its role of fostering economic development opportunities seriously and has worked closely with the region's businesses and industries to foster job growth. In April 2008, City Utilities entered into an agreement with the federal government to reduce combined sewer overflows. Seeing an opportunity to "marry" an unfunded federal mandate with a renewed community interest in rivers as a front door amenity, the City of Fort Wayne and City Utilities redoubled public outreach efforts to explain both costs and benefits of investing hundreds of millions of dollars in sewer system improvements. Upon completion of the program in 2025, sewer overflows will be reduced by 90%. This commitment to river water quality improvement has spurred new investment in the riverfront including parks, retail space, and residential development. This renewed interest is not only providing residents of Fort Wayne and Northeast Indiana the ability to enjoy the rivers, but is also a way to attract the emerging workforce by focusing on quality of life.

The capstone project in the combined sewer long term control plan is a five-mile long sewage collection and transportation tunnel. Tunnel excavation will produce a huge amount of limestone spoil. As part of City Utilities' commitment to expanding materials recovery and reuse, the spoil will be cleaned, crushed, stored and used as pipe bedding material and backfill for city-initiated utility and transportation construction projects. This effort builds on a long-standing City program to recycle waste concrete. Recycling and reuse, along with a green fleet program, retrofitting buildings to reduce energy use and a City-wide, single stream recycling program with more than 75% participation are programs that helped the City to twice achieve Green Community recognition from the Indiana Association of Cities and Towns.

As part of a commitment to be a regional service provider and grow business to business relationships, City Utilities has begun to offer services to other utilities in the region. In 2016, City Utilities began providing billing and account management services, engineering assistance, financial management assistance, payroll and human resources services, and preventative maintenance services to the Allen County Regional Water and Sewer District. Using City Utilities as a service provider has allowed the District to focus more on its primary mission: extending public sewers to areas with failing septic systems.

In 2014, after years of planning and discussion, City Utilities created a public-private partnership with Aqua America that involved more than 20 million in infrastructure investment by both parties. The package is backed by a long-term send-or-pay contract and involves sending an average of 1.5 MGD of municipal wastewater to an expanded Aqua America wastewater treatment plant. New housing growth of more than 5,000 expected units will allow for the repurposing of the same expanded treatment facility once the agreement reaches its natural term. By leveraging the performance of the treatment plant, City Utilities can delay or eliminate more than $18M in planned construction projects while remaining in regulatory compliance and growing as one of the most affordable places to live.

City Utilities is also committed to continuing the transformation of our traditional wastewater treatment system into a community resource recovery center. Work continues on a program to acquire more high strength waste to help generate more methane, thereby reducing the use of electricity at the Water Pollution Control Plant. Partnering with a private company for marketing and management of the biosolids and compost facility has allowed City Utilities to distribute more recovered material, thus increasing revenue streams through new products and services. This operation – although longstanding – forms the basis for Fort Wayne City Utilities to quality as a Utility of the Future.

Energy Generation & Recovery

In 2014, Fort Wayne City Utilities enacted and implemented an energy policy defining City Utilities commitment to the efficient, cost effective and environmentally responsible use of energy throughout it water and wastewater treatment facilities. Within the plan, City Utilities promoted energy efficiency by implementing cost effective programs that will demonstrate an attractive return on investment, optimize service reliability, improve wires to water production optimization, reduce carbon footprint and greenhouse gas emissions, improve energy consumption and cost, and improve education/communication with staff on energy management, conservation and metrics.
Using 2012 as the baseline year, it is City Utilities objective to reduce energy consumption (electrical and natural gas) 10% by 2015, reduction of 25% by 2018 and become energy independent (net zero energy consumer) by 2025. To use energy efficiently and to provide energy security of the organization, both immediate and long range. This will be accomplished by:

- Implementing the Plan-Do-Check-Act management systems approach which is a circular evolving process that focuses on continual improvement over time;
- Implementing of ISO50001 – Energy Management Systems;
- Understanding City Utility's current energy consumption through the use of energy metrics (Wires to Water);
- Educating our engineering and plant staff on energy management and conservation best practices;
- Optimizing utility rates structures to reduce energy costs;
- Utilizing energy efficient measures throughout the utilities operations;
- Incorporating energy efficiency into existing equipment and facility upgrades, as well as in the selection and purchase of new equipment by adopting new purchasing and bidding procedures to specify that any new equipment purchased must be energy efficient;
- Utilizing and optimizing renewable energy resources available at our facilities;
- Reducing non-revenue water;
- Complying with governmental regulations – federal, state and local.

From the plan and processes, City Utilities identified three initiatives/projects which include:

- Water Pollution Control Plant's Combined Heat and Power (CHP) System
- Fort Wayne City Utilities Grease Coop Program
- Resource Recovery Program

The Water Pollution Control Plant's wastewater treatment facility's Combined Heat and Power system was put into full operation October 2015. From October 2015 to present the CHP system has generated 16,753,709 kilowatt-hours with a 31.6% average reduction in electricity purchased from the local utility through the use of two 400 kW biogas engine driven generators.

The Resource Recovery Program was implemented in 2015 where City Utilities signed a contract with Nestle to accept high strength waste which increased our average daily biogas production by 25%. Due to these efforts, in 2018, City Utilities started Phase 2 of its resource recovery plan. This plan will seek competitive proposals from a qualified firm to serve as a single point administrator for the delivery and management of a liquid organic waste program to the Water Pollution Control Plant (WPCP). The liquid organic waste procurement and managing firm would be responsible for identifying sources of high strength waste and FOG, collaborating with CU on FOG Coop Program for local food service establishments and securing agreements from these sources to deliver their wastes to the receiving station at WPCP in an effort to reach net zero energy consumer by 2025.

Additionally, City Utilities plans to implement the Fort Wayne City Utilities Grease Cooperative (FWCUGC) which is an innovative partnership between City Utilities and its restaurants to better manage fats, oils and grease (FOG) by the 4th quarter of 2018. FWCUGC will negotiate pricing and provides service quality on behalf of member restaurants that voluntarily enroll in the program as an alternative to being held responsible for compliance of existing ordinances and reliance upon contracted waste haulers.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph? Steps for Designing, Implementing and Sustaining Energy Efficiency Improvements in Water and Wastewater Facilities involved the following:

A. Plan
    - Preparing of Energy Management and Conservation Program
        - Establish City Utility's Energy Policy and overall energy improvement goals
        - Secure and maintain management commitment, involvement and visibility
        - Choose an energy baseline
        - Establish energy improvement program leadership
        - Secure and maintain employee and management buy-in
    - Assessment of Current Energy Baseline Status
    - Establishment of Energy Vision and Priorities of Improvement
    - Identify Energy Objectives and Targets
        - Establish energy objectives and targets for priority improvement areas
        - Define performance indicators
B. Do
    - Implement Energy Improvement Programs
    - Build a Management System to Support Programs
        - Develop action plans to implement energy improvements
        - Get top management's commitment and approval
        - Develop management system operating controls: to support energy improvements
        - Begin implementation once approvals and system are in place
C. Check
    - Monitor and Measure Results of the Energy Improvement Management Program
        - Review of City Utility facilities currently monitors and measures to track energy use
        - Determine what else the facility needs to monitor and measure its priority energy improvement operations
        - Develop a plan for maintaining the efficiency of energy equipment
        - Review the facility's progress toward energy targets
        - Take corrective action or make adjustment when the facility is not progressing toward energy goals
        - Monitor and reassess compliance status
D. Act
    - Maintain the Energy Improvement Program
        - Continually align energy goals with business/operation goals
        - Apply lessons learned
        - Expand involvement of management and staff
        - Communicate success

What type and amount of resources were needed to support implementation?

Several staff members and their expertise were utilized to support the implementation of the Energy Plan and development of the programs the team felt would meet the goals and objectives established in the plan. In addition, City Utilities utilized local University talent through its Internship program to help with the gathering of data necessary to determine the parameters to monitor and help verify the results of the initiatives. As for funding, City Utilities was able to utilize the Guaranteed Savings Contract process for the construction of the Combined Heat and Power System while using Indiana's State Revolving Funds as a funding source which also gained us a percentage discount on our interest rate for use of a "green" initiative.

Did you partner with other stakeholders or organization as a part of your implementation process?

As a part of energy efficient efforts, City Utilities submitted application to Indiana Michigan Power's Energy Efficiency Incentive Program. Through the utility incentive program, City Utilities has received energy related rebates totaling over $15,000. In addition, City Utilities utilized Purdue University's Technical Assistance Program to help with the

development of the energy plan in 2014. This help of this program, City Utilities is saving an average of 120,000 kilowatt-hours annually through plant process improvements.

What was the most critical obstacle that your utility had to overcome to be successful in this area?

Staff resources were our biggest challenge/obstacle. There was a significant learning curve for both the Resource Recovery Program and Combined Heat and Power project because it fell outside our normal operating responsibilities. With regard to the Fort Wayne City Utilities Grease Coop, City of Fort Wayne has over 1,900 food service establishments and only three inspectors to make sure each establishment is conforming to current ordinances. This became a real challenge when it came to implementing the program.

Has "smart" information technology supported your implementation/optimization in this area?

Yes, through the use of SCADA, iHistorian, Allen Bradley's Energy Management system, and Energy Dashboards developed with the use of Excel, City Utilities is able to effective communicate and verify the results of the initiatives/programs.

Where could other utilities go to find additional information of this Activity Area or the activities/practices/programs that you have implemented?

City Utilities website: https://www.cityoffortwayne.org/utilities/city-utilities.html.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Power purchased from utility	25% reduction in power purchased from utility by 2018	Currently, City Utilities is experiencing an average reduction of 31.6%
Percent of renewable generation from biogas production	30% of renewable generation from biogas production	Currently, City Utilities is experiencing a 31.5% in renewable generation from biogas production

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Houston Water**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Multiple plants		
Service Area (square miles): 600	Average Annual Daily Flow or Demand (MGD): 239	
Population Served: 2.2 million		
Location		
Street Address: 611 Walker		
City: Houston State: Texas	Country: USA	
Zip Code/Country Code: 77002		
Utility Representative Contact Information		
Name: Aisha Niang	Phone: 832-395-5465	Email: Aisha.niang@houstontx.gov

Organizational Culture

Houston Water, within the department of Houston Public Works (HPW), is managed in accordance with a threefold task of ensuring public health, protecting the environment, and providing superior customer service. These meaningful core undertakings are also captured in our organizational mission statement. The executive team has cultivated an

organizational culture based on a commitment to performance excellence through competence, continuous improvement, innovation, courage, integrity, selfless service, stewardship, and teamwork. Houston Water leadership is focused on the community and strives to promote a collaborative work environment while treating water and wastewater in an effective, efficient, and responsible manner to serve Houston's citizens.

To aid in strengthening our workforce, an innovation group was created to develop a performance incentive management process. The goal of the group is to design a transparent, impartial, and cost-effective performance incentive program with an attitude towards customer service excellence and an emphasis on the department's core business objectives. The process will not only increase the productivity and quality of work performance, it will enhance employee efficiency while retaining a high-performing workforce.

In order to engage employees in the performance process, Houston Water implemented *360 Evaluations*. This management developmental tool allows personnel in supervisory positions to assess themselves as well as be evaluated by their direct reports. All employees are encouraged to continuously grow and develop. In turn, HPW provides various in-house training programs to enhance technical and professional skills. These classes are offered at no cost to the employee and include courses for technical license renewals, Microsoft Office, resource management, resume writing, and interviewing skills. Additionally, leadership development seminars are offered where participants learn from peers in current and related departments. This encouragement for growth also extends to participation in industry conferences, authoring of homogeneous publications, and to serving as chairperson or leadership in other organizations. Houston Public Works is constantly working to develop and train its employees to ensure that all personnel are efficient, effective, and satisfied with job performance. As such, succession planning and advancement opportunity is at the forefront of several initiatives.

Waterways is Houston Water's quarterly employee newsletter. This publication seeks to educate, motivate, engage, and acknowledge the accomplishments of various employees throughout the year. It also serves as an avenue for announcing news and other pertinent information. It plays a key role in boosting employee morale which increases productivity and overall employee performance. Sections in *Waterways* include a message from Houston Water's deputy director commending employees for their efforts and providing a vision for the department, a commendment section featuring appreciation letters from customers that highlights the exceptional work an employee(s) performed, an acknowledgement section that identifies the different roles and responsibilities of varied staff members and their contributions to Houston Water, and notes other significant achievements that summarize Houston Water successes. *Waterways* also strives to engage employees by giving them opportunities to submit relevant content and ideas. In this way, they are not just recipients of the newsletter, they are actively a part in the production of it.

Houston Water has an active social media presence where it spotlights employee efforts and department initiatives. For example, the Adopt-A-Drain program was created to reduce flooding by allowing citizens to search for the drain nearest to their residence, take ownership of it, and name it. Ownership requires the participant to commit to cleaning 10 feet on both sides of their drain at least four times per year and compost the debris or place collected leaves in a lawn bag. "It's Draining Men", "Sir Drains a Lot", and "Calvin and Hobbs" are just some of the hilarious nicknames people have suggested or named their drains. The program was just one of the innovative solutions presented at the 2017 Houston Hackathon. Hackathon is the platform Houston's "civic hackers" use to pitch ideas and display innovative new websites, mobile apps, and insightful data visualizations that address community and City problems.

In addition to employee development and community outreach, Houston Water strives to include sustainable practices in all aspects of operations. It is one of a handful of agencies using Envision and has Envision sustainability professionals on staff. Envision provides guidance on sustainable best practices and serves not only as a planning and design tool, but also as a means of evaluating completed infrastructure projects and operations.

Houston Public Works is the nation's largest department to receive the American Public Works Association (APWA) accreditation. Several of the City of Houston's existing practices are exceeding the APWA's expectations and over 35 are recognized as role model practices.

The City recently announced development of the Houston Water Innovation Hub. The Hub is a first-in-the-nation, urban water demonstration site and showcase mechanism for global, national, and home-grown breakthroughs. Both emerging and proven technologies are emphasized. One of the inaugural proposals focuses on sludge and biosolids management. Innovation Hub demonstration projects are scheduled to begin in Summer 2018.

Houston Water believes its organizational culture has fostered an atmosphere for customer service excellence, employee engagement, and innovation that not only enhances the lives of all Houstonians but also has a positive impact on the world.

Beneficial Biosolids Reuse

The City of Houston owns and operates 39 wastewater treatment plants that are permitted to treat wastewater flows of over 560 million gallons per day. Loading of these plants is controlled by an extensive and effective pretreatment program. All plants utilize activated sludge biological treatment without primary clarification or anaerobic sludge digestion. Residual solids are generated via preliminary treatment (screening and grit removal), secondary treatment (waste activated sludge), and regularly scheduled cleaning to remove accumulated solids.

Management of waste activated sludge (WAS) has been consolidated into 13 "preparer plants" that produce approximately 45,000 tons of dry sludge per year. Liquid sludge is pumped between plants, transferred in deep gravity tunnels, or hauled in tractor/tanker trailer rigs. Technologies utilized to produce biosolids products include screening, gravity thickening, aerated storage, polymer conditioning, belt filter press and centrifuge dewatering, and thermal drying. Two of the preparer plants handle 70% of the WAS tonnage produced and also prepare Class A, exceptional quality biosolids that are marketed, sold, and beneficially used as heat dried biosolids fertilizer (HDBF). The remaining 11 preparer plants handle 30% of the WAS tonnage produced and currently prepare unstabilized cake for co-disposal in area solid waste landfills.

Activities associated with managing the City of Houston's biosolids program can include:

- Attracting and retaining qualified managers, supervisors, and staff to operate and maintain the intricate biosolids management system.
- Maintaining compliance with applicable policies, rules, and regulations.
- Providing adequate financing to modify/expand, operate, and maintain the system.
- Identifying the extent of contracted services.
- Identifying and purchasing numerous supplies and capital equipment.
- Planning, designing, and constructing system expansion and upgrades.
- Continuous improvement and innovation.

a. How did you go about implementing the practices/activities/programs that you described in your overview paragraph?

The City of Houston is a leader in recognizing the potential for converting sewage sludge into heat dried biosolids that can be used as agricultural fertilizer. Houston began its wastewater biosolids recycling program in 1921, making it one of the oldest green initiatives in the country in this field. Houston is a pioneer in biosolids heat drying and heat dried biosolids production. This process has been a mainstay of the City's biosolids management program. In the early days of operations, when several coastal cities in the U.S. were still pumping wastewater sludge into the ocean, Houston was shipping heat dried biosolids pellets by rail to help fertilize the citrus groves in Florida. Today, Houston owns and operates an intricate biosolids management system that continues to produce valuable biosolids products for beneficial use across the country. Recycling of biosolids into fertilizer allows the City to be environmentally responsible by reducing the need for landfills, enriching the soil, and replacing the land's natural resources. Houston recognizes that recycled biosolids are not a waste, but a resource that can be sold as product.

Personnel. Finding personnel to properly operate complicated process units such as heat dryers is difficult, therefore the majority of O & M personnel utilized have worked their way into involvement with such units. This incorporates extensive on-the-job training as well as formal training (e.g., manufacturers and TEEX operator). The City has developed and implemented standard operating procedures (SOPs) for topics such as 6sludge processing, conditioning, storage, biosolids trailer loading, transportation, and end use/disposal.

Compliance. The concentration of pollutant heavy metals in Houston's biosolids is a fraction of 40 CFR 503, Table-3 Pollutant Concentrations due to an effective pretreatment program. The City's biosolids products are always in

compliance with pollutant control, pathogen reduction, and vector reduction requirements. Product distribution is unlimited.

All biosolids transportation equipment is properly inspected, registered, licensed, and permitted per the applicable federal, state, and local regulations. The City requires that contract carriers maintain 100% compliance with the Federal Motor Carriers Behavior Analysis and Safety Improvement Categories (BASICs) Intervention Thresholds (Unsafe Driving, Fatigued Driving/Hours of Service, Driver Fitness, Controlled Substance and Alcohol, Vehicle Maintenance, Cargo, and Crash).

Contract Services. The scope and extent of contract services associated with operating and maintaining plant process units within the biosolids value chain has evolved over time. Contract services currently include: tanker sludge hauling, dewatering equipment maintenance, heat drying equipment maintenance, biosolids conveyance, silo storage, and marketing, as well as operation and maintenance of several sludge transfer plants and one cake preparer plant. The City identifies the size and components of the sludge tanker fleet and controls their weekly logistics along with the sludge cake end dump fleet. Dewatering equipment maintenance (belt filter press and centrifuges) includes semiannual preventive maintenance as well as reactive maintenance tasks for all components and ancillary equipment. Approximately $500,000 is spent annually on maintenance. Dryer maintenance includes annual shut-down inspections and cleanings as well as preventive and reactive maintenance tasks for all components and ancillary equipment. Almost $3M is spent annually on these efforts.

Over 99% of the produced HDBF product is sold as a fertilizer and soil amendment to agriculture businesses (farms, ranches, and fertilizer blending facilities). The demand exceeds production to the point of being sold out several months ahead of time. The product is marketed under different trade names such as Hou-Actinite™, Cultivite™, and Sustanite™. The size and nutrient density in Houston's HDBF is guaranteed, but the product includes other beneficial micronutrients. Less than 1% of the product is lost due to spills, equipment shutdowns, etc.

Houston's HDBF product was recently sold to 60 customers in 6 states, however 53 customers from 25 counties in Texas also purchased the product. Total revenue of the product sales is above $1.2 million per year and the City shares 19% of the total profit. This income partially offsets the cost of maintaining the dryers.

Supplies. Electric and natural gas (dryer furnaces) supplies are provided as part of City-wide contracts. Sludge conditioning polymer is provided via a multi-year supply contract.

Planning. In 2017, the City hired a national consulting firm to help update the City's Biosolids Management Plan. The firm examined the biosolids management alternatives using existing, proven technologies and practices as well as new alternatives proposed by outside organizations. Numerous near-term and long-term system modifications are planned.

Continuous Improvement. In April 2012, Houston's Sims Bayou wastewater treatment plant system was recognized by the National Biosolids Partnership (NBP) for implementation of a biosolids environmental management system (EMS). The system received Bronze-Level recognition. Houston is currently working to expand EMS City-wide. For example, the City is implementing Root Cause Analysis (RCA) and Preventive/Corrective Action procedures that address identified contract non-compliances and program non-conformances. In 2012, the City of Houston enforced a policy on wastewater biosolids management to reiterate and institute its commitment to maximizing beneficial biosolids reuse. Then, in 2013, the City enacted a continual improvement policy as a structure and doctrine for comprehensive and continuous performance improvements within department, operations, maintenance, planning, design, construction, regulatory, administrative, and financial functions.

Innovation. The City has participated in and supported numerous studies on innovative biosolids technologies. One such effort was the City's $45K commitment for the WERF LIFT Bioelectro Project. The City and its marketing contractor are jointly working to improve product quality, to increase product output, to expand markets, and to balance the production capabilities and market desires. Systems and procedures have been optimized to the point that sludge/biosolids handling costs have been reduced to just 15% of the wastewater utility's annual O & M budget versus 30 to 40% at most utilities.

b. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

Committed resources consist of:

i. Wastewater Operations (WWO) consists of process control staff, maintenance staff, laboratory staff, engineering staff, capital project staff, other support staff, and senior executive management. Over 70 full-time personnel are dedicated to sludge processing and biosolids handling.
ii. Consultants, contractors, sub-contractors, vendors, manufacturers, and suppliers.
iii. Total annual CIP budget for wastewater utility is over 185 million.
iv. Total annual O & M budget for wastewater utility is over $160 million.
v. Budget for annual capital purchases for wastewater utility is over $12 million.

c. Did you partner with other stakeholders or organizations as a part of your implementation process?

The City of Houston partnered not only with environmental organizations, local, state, and federal regulatory agencies, but also with regional agriculture businesses, universities, other municipalities, and numerous consultants, contractors, manufacturers, suppliers, and vendors during implementation. A representative from the Metropolitan Water Reclamation District of Greater Chicago and a representative of the Northeast Biosolids and Residuals Association were the City's mentors on the path to obtaining WEF/NBP Bronze-Level recognition for the Sims Bayou system. The City partnered with AccelerateH20, WERF's LIFT program, Isle Utilities, and other organizations in the implementation of the Houston Water Innovation Hub.

d. What was the most critical obstacle that your utility had to overcome to be successful in this activity area, and how did you do that?

There are a large number of treatment plants as part of its wastewater utility and the most critical obstacle the City of Houston had to (and continues to) overcome to be successful in beneficial biosolids reuse is defining the content and extent of its biosolids management value chain and the type, the amount, and location of related resources. At the rate Houston grew and continues to grow, along with changing regulations and public opinion, the wastewater utility was forced to rapidly incorporate existing facilities and to expand and modify existing facilities. From a biosolids management perspective, the utility had to define the scope and extent of related facilities. For example, which facilities would be sludge transfer plants (consolidated only from a sludge handling perspective), which would be cake preparer plants, which would be biosolids production/product plants, what tonnage of Class A/EQ heat dried product could be produced and where. With numerous stakeholders in place, the City had to monitor and adjust to changing regional conditions outside the plant's gates. Product marketing efforts are forced to continually evolve to adjust to regional biosolids and national fertilizer market issues. Plants that had historically prepared Class B biosolids for land application had to be converted to cake disposal plants until drying methods were identified because of evolving public opinion and third-party land permitting approaches. Biosolids management plans/documents had to be updated and adjusted to reflect changing conditions. Early in the development of its modern wastewater utility system, City of Houston leaders recognized the need for heat drying of its wastewater sludge. Due to issues such as land space and odors, activated sludge wastewater treatment plants were built without primary clarification and anaerobic digestion. Traffic patterns limited the amount of water (liquid sludge and cake) that could be hauled via truck between facilities and end uses/disposal.

e. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

Utilized technologies include: process unit instrumentation, controls, and SCADA systems, laboratory technology and HachWIMS database, onboard truck and platform scales, Enterprise Asset Management software, Infor EAM work order software, dryer proportional feed systems (PFS), and GPS truck tracking telematics systems.

f. Where could other utilities go to find additional information on this activity area or the activities/practices/programs that you implemented?
The link for Houston Wastewater Operations is:
https://www.publicworks.houstontx.gov/pud/wwops.html
Formal bids and RFPs for the service and supply contracts can be accessed at:

http://purchasing.houstontx.gov/bids.html
Capital Improvement Projects can be accessed at:
https://www.publicworks.houstontx.gov/capital-improvement-projects
Houston Water Innovation Hub can be accessed at:
https://www.houstonh2o.org

Performance measures and results:

Measure **What are you measuring?**	**Targets** **What was your goal/intended outcome?**	**Outcomes** **What are your actual outcomes?**
Percent of biosolids beneficially reused	100% beneficial reused	99% beneficial reused
Increase HDBF customer base	Continual increase in number of customers	In 2017, customer base increased by 10 additional customers
No. of valid odor complaints	Zero valid complaints on land applied biosolids odor.	Zero valid odor complaints.
NPDES and TPDES permit compliance – Sludge provisions	100% compliance	100% compliance
NBP EMS certification	Obtain Gold-Level, system-wide	Sims Bayou Bronze-Level
Cake percent solids / Dryer capacity	BFP cake: 14% Centrifuge cake: 18%	80% compliance
HDBF nutrient density	100% guaranteed nutrient density of 5-2-0 to 6-3-0.5 (N-P-K) and 1% Iron	Met 100% guaranteed nutrient density
Polymer type	Monitor and adjust polymer type as needed by plant	Polymer type adjusted at one, major plant

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Kenosha Water Utility Wastewater Treatment Plant**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional System		
Service Area (square miles): 28 square miles in the city of Kenosha; 85.7 square miles in regional sanitary sewer service area	Average Annual Daily Flow or Demand (MGD): 22	
Population Served: 99,600 in the city of Kenosha; about 130,000 regional		
Location		
Street Address: 7834 3rd Ave		
City: Kenosha	State: WI	Country: USA
Zip Code/Country Code: 53144		
Utility Representative Contact Information		
Name: Ed St. Peter or Melissa Arnot	Phone: 262-653-4300 262-653-4335	Email: estpeter@kenosha.org, marnot@kenosha.org

Organizational Culture

The Kenosha Wastewater Treatment Plant is a regional facility started in the 1930s. In the past ten years, the plant has undergone many upgrades and improvements, which have transformed it from a plant where you could just monitor the levels and flows and adjust individual processes to an integrated system where there is constant thinking involved and

evaluation of how one change will impact the entire process. The management and operating staff have evolved in their way of thinking on handling wastewater treatment.

The Kenosha Water Utility is a joint utility for water and wastewater. It is directed by a Board of Water Commissioners that are elected City of Kenosha Alderpersons and then appointed to the board. The General Manager for the Utility has been with the utility for 47 years and likes to be on the cutting edge, sometimes "bleeding edge", but also be fiscally responsible. The Utility leadership has always endeavored to be extremely conscientious of the consumer's rates and taken efforts to keep the rates low while providing a high level of service. All potential projects are evaluated for their projected return on investment and impact to the process.

The General Manager, along with the Board of Water Commissioners, have the ability to seize opportunity when it is knocking and to make things happen. When presented with solutions that are innovative, they can move forward with those projects. There is not a lot of red tape or bureaucracy to cut through. When there are new board members appointed, they are trained by the utility staff on all aspects of the utility. This allows them to gain knowledge and trust in the operations.

Teamwork is a key element to the success of the utility. Because we are a joint utility, we can pull staff from other departments when we have large projects. There are a number of individuals included in discussions, negotiations, and presentations for new equipment. These will range from the general manager to the mechanic, operator or electrician. By including everyone in the beginning of the process, things can progress more smoothly during implementation.

The wastewater staff made all of the advancements possible. They had to learn how to operate and maintain many new pieces of equipment that have entirely changed the landscape of the treatment. Now they have to think about how changes will affect efficiencies with heat and electricity. They think about what other part of the process will be impacted by a change that is made. The utility has recognized the staff at all levels for their participation in the success of the projects.

We try to empower and educate all of the employees, so they understand the impact of their decisions. This also allows them to come up with ideas and suggestions for improvements. Staff is encouraged to participate in local organizations and network with other utility employees. Wastewater is a complex process and there are a lot of plants with different ways of doing things that we can learn from. We will frequently call other utilities to do checks on new products that we might try or new problems that we encounter.

The General Manager has developed unique partnerships with local manufacturers to allow them to utilize our facilities for training and testing and trials for innovative technologies. Through their participation, we gain knowledge and experience. We allow manufacturers to bring in potential customers to view the equipment and to ask our operators questions. During this time, we question the manufacturer's potential customers and learn about different treatment techniques and solutions.

The utility supports student and community learning. We provide tours to many school and scout groups within the city. The staff works hard to show the young minds the importance of our industry. We participate in community activities such as Earth Day and provide a number of educational materials.

Safety is a top priority of the organization. All employees are required to participate in CPR training. The utility works with the City and Stormwater Utility to utilize trainings offered from our insurance agency such as confined space, PPE, lockout/tagout, etc.

A future goal of the utility is to become even more efficient and eventually to become energy neutral.

Partnering & Engagement

Public Outreach and Involvement has included school and scout group tours at the plant, outreach conducted at Gateway Technical College during Earth Day and at UW-Parkside for Kenosha Days, and a full public tour to showcase the award winning energy optimization project. The public tour was a joint effort between the utility and the local manufacturer, Centrisys/CNP.

Partnership with the local manufacturer Centrisys/CNP allowed technology advancements, innovations, education for both parties, awards including the ACEC WI Engineering Excellence Grand Award and 2017 W&WD Top Project Award.

To highlight the all of the new equipment in the plant a WEFTEC sponsored tour was held, which included partnerships with many of the other equipment manufacturers including Enviro-Care, Vaughan, Netzsch, Unison, and Kraft Power.

Partnership with Centrisys/CNP and Carthage College allowed us to show positive results from the use of our Class A EQ biosolids, biosolids informational flyer, contact local farmers and agriculture resources to gain knowledge of phosphorus and nitrogen application rates.

Implementation and partnerships: Tours at the plant are handled by the Chemists in the lab. They show the students samples from various parts in the process to give a visual of how the liquid and solid treatments work. Many times tours are combined with the water treatment plant.

Outreach at local colleges included posters, videos, giveaways, and a traveling toilet showing what not to flush including grease and flushable wipes. This is handled by administration staff.

The public tour required all of the wastewater staff to participate along with staff from Centrisys/CNP. The goals of the tour were to educate more of the public on the plant process, highlight the recent upgrades success, and communicate with more neighbors. Many meetings were held to make sure that the plant was ready visually and from a safety standpoint. A full utility staff and Centrisys/CNP staff tour and luncheon was held a couple days prior to the public tour as a thank you for all of the staffs' hard work in preparing for it and also as a test run. The public tour included educational resources and giveaways. A public awareness brochure was developed to describe the treatment process, our environmental programs, and other important utility information. We use the brochure and the other resources at the public outreach events and as information to anyone who asks for it.

The plant is located in a residential neighborhood, with houses along the outside fence of the plant. Odor is a topic of concern and complaints among the neighbors. We have a call log and respond to complaints that are received. In an effort to minimize the odors from the headworks, we worked with US Peroxide to perform trials using hydrogen peroxide. We dosed at two different locations and at various dosing rates. We purchased the chemicals from them and they provided the odor logging data, suggested dosing rates, and results. We worked together and were able to greatly reduce the odors from the sewer system and the haulers. They were able to submit the study results for presentation proposals at the odor control conference.

Centrisys/CNP is a local centrifuge manufacturing company in Kenosha WI. They started in 1989 and began their partnership with Kenosha Water Utility in 2009 when we installed a dewatering centrifuge to replace our plate and frame presses. The replacement paid for itself in less than a year by reducing labor, chemical and maintenance costs. In 2011, the partnership advanced when we installed their first WAS thickening unit. This replaced our aging DAFT bays. The operators were very surprised by its ease of operation. In 2015, Centrisys/CNP again brought innovation to the plant. They presented us with an option to upgrade our solids process and install: the first US PONDUS thermo-chemical hydrolysis (TCHP), a primary sludge thickener, the first US Sülzle Klein sludge drier and CHPs. Our partnership with Centrisys/CNP has allowed us to take risks and try new products at less of a capital cost. Centrisys/CNP benefits by being able to bring new employees to the plant to learn about wastewater, complete test runs on their equipment, train service personnel on the equipment, and give tours to new clients. We have a service agreement with Centrisys/CNP for their equipment which allows us to utilize their inventory and trained staff.

Carthage College and Centrisys/CNP partnered with us to have an intern student study the beneficial results of our biosolids. We did not have the staff or the resources to market and research the new Class A EQ biosolids that were a result of our project. The internship allowed us to show measurable results to the public and farmers by growing grass in the college greenhouse. Test experiments were also performed on plants. Research was done on phosphorus in biosolids versus fertilizers and local agriculture experts were surveyed. Through all of the work done by the intern, a flyer was developed for use by anyone using the biosolids to show proper application rates for homeowners and farmers. Meetings were held with the student and Centrisys/CNP to make sure that the goals we set were achievable and applicable.

Resources needed: All of these efforts require staff from other utility departments to help with implementation and coordination. We utilized Centrisys/CNP marketing department for their expertise in developing brochures, flyers, and planning events.

Critical obstacle to overcome: One of the biggest obstacles to overcome was to change the mindset of the staff and get them excited to have all of the interest in their plant and their operation. It is a lot of work to get a plant ready for a public tour and some other things have to get put on hold. Getting staff to see the importance of the outreach was critical.

Additional information can be found at: www.kenosha.org/departments/water-utility/, http://centrisys.com/sites/all/themes/theme549/downloads/Centrisys-CASE-STUDY-Kenosha-Optimization-2018.pdf, and https://cnp-tec.us/kenosha-energy-optimization/

Measure What are you measuring?	Targets What was your goal/intended outcome?	Outcomes What were your actual outcomes
Public Tour	Showcase new project and educate	300+ participants, educational materials were displayed and distributed
Biosolids Education Materials	Show benefits of biosolids through an internship with a student at local college, Carthage along with Centrisys/CNP support	Successful experiments with plants and grass were performed, handout was created, phosphorus information was summarized
Public Education	Provide tours to school groups and participate in community events	Participate in Earth Day & Kenosha Day Host school tours totaling 275 students in 2017
Reduce odor to improve relationship with the neighbors	Study impact of hydrogen peroxide in odor reduction through partnership with US Peroxide	Reduced odors in the headworks. Identified two dosing locations and the dosage that significantly reduced odor over just one location at a higher dose.
Improve Dewatering process	Reduce chemical cost and maintenance through partnership with Centrisys/CNP	Installed dewatering centrifuge which paid for itself in a year through reduced chemical and maintenance costs.
Improve solids process through technology advancements and innovation; increase efficiency	Improve solids process through thickening, mixing, and hydrolyzing, increase gas production and reduction in biosolids through energy efficiency project and partnership with Centrisys/CNP	Reduced digester capacity through thickening, increased gas production 20+% through hydrolyzation, increased VSR, producing 1/3 of the plants energy, achieved Class A EQ biosolids. Awards for project from ACEC and W&WD.

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Lafayette Renew**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Class IV Activated Sludge Treatment Facility and Storm Water Utility		
Service Area (square miles): 28	Average Annual Daily Flow or Demand (MGD): 18 MGD	
Population Served: 72,000		
Location		
Street Address: 1700 Wabash Avenue		
City: Lafayette State: IN	Country: United States of America	
Zip Code/Country Code: 47909		
Utility Representative Contact Information		
Name: Brad Talley	Phone: (765) 807-1800	Email: btalley@lafayette.in.gov

Organizational Culture

Over the past several years, the Water Pollution Control Department of the City of Lafayette has continued to evolve from a more typical historic role as a public utility focused primarily on just cleaning and treating wastewater to meet permit limits for water quality, to a Utility of the Future (UOTF) model.

In working together with the Wabash River Enhancement Corporation (WREC), a non-profit agency dedicated to riverfront development and improving water quality, we recognized that we were embarking on a process of shifting the focus and the culture of our utility toward greater engagement with the public. Through our growing involvement with the WREC, and its other partners, including Tippecanoe County, West Lafayette, Purdue University, and the Greater Lafayette Community, it also became even more apparent to us as a water quality utility, that the public has and wants a stake in the process of enhancing and improving the Wabash River as a vital part of the community. They need to be involved.

The realization that what we do as a public utility has a very real and significant effect on those using these critical resources now, as well as in the future, was the impetus for the Department to adopt Utility of the Future concepts within our organization. Knowing that what we do every day ultimately benefits the community and our residents, we actively began to do our part to develop proactive relationships with stakeholders to establish a more sustainable, healthier and stronger community.

But, before we could effectively move to a UOTF model, we first had to fully consider and understand our utility's existing image, both internally and externally. This process brought us to a new awareness of our current brand, and fueled our decision to move forward with an effort to rebrand from the existing limitations and perceptions of our traditional role as the Water Pollution Control Department, to now being identified by the new and more encompassing name of Lafayette Renew to represent our broader commitment to serving the community with a focus on sustainability.

The rebranding effort was a highly collaborative process that involved our entire staff. We engaged everyone on our team at multiple meetings to get their input and feedback focused on addressing several key formational issues:

- what do we think we currently are as a utility,
- what do our customers think we currently are as a utility,
- what do we think our customers would like us to be as a utility,
- what do we aspire to be as a utility.

From these discussions, staff helped to determine that our organization needed an official mission statement, since we did not have one as the Water Pollution Control Department. Many acknowledged that as an organization, we already practiced and believed in certain common values as part of our daily duties and responsibilities, however, those actions and values needed to be clearly expressed and shared with all. As part of this process, an official mission statement was developed to better represent our utility under its new name as Lafayette Renew. In all discussions with staff, partnering with the public, environmental groups, and other utilities, was consistently mentioned by staff as a high priority for our organization. As such, the concept of developing local partnerships was specifically incorporated into the Lafayette Renew mission statement along with our core values and commitment to sustainability, public outreach, and service to the community.

In addition to defining a clear, consistent mission for the utility, other overall goals for rebranding were to:

- Unite and align our staff around the utility's mission, vision, and values
- Present a clear and recognizable image to the community we serve
- Communicate this brand image consistently to customers and future staff

As part of the rebranding, we continued to have regular meetings to bring staff together to provide additional input throughout the ongoing process and to strengthen their alignment around the Lafayette Renew mission. Through this continued collaboration with staff, we were also able to transform our internal culture, encouraging employees to shift from viewing themselves as utility workers to being environmental professionals and stewards of the community. To foster this attitude, we offered staff opportunities for continued learning by cross training and obtaining certifications related to their work. This is being done in part so that each employee better understands the significance of their job and how what they do plays into the holistic model of treatment. It allows our team, as a whole, to see the complexity and significance behind each role and the part they play in serving the bigger picture of Lafayette Renew and the water reclamation process. It is vital that we continue to expand the skills and knowledge of our employees to support our growing mission and partnering opportunities.

Next, we also continued to expand our partnership with WREC and involvement in various community events by other local groups to introduce the new Lafayette Renew brand to the public. Our staff actively embraced this type of outreach by volunteering for events to engage both students and residents and to educate and inform them about our work and commitment to sustainable practices that improve the environment and the quality of life in Lafayette.

These events and outreach activities by Lafayette Renew included:

- Community green infrastructure projects that educate and encourage the participation of area residents in sustainability efforts that will benefit the community, such as the utility's rain barrel program
- Partnerships with Ecological and Environmental Engineering classes at Purdue University to promote and develop rain gardens within the city
- Classroom presentations and plant tours for the public highlighting the facilities and the mission of the utility to support a sustainable future for the community
- Interactive educational booth at the City's Farmers Markets
- Outreach efforts to engage the public at Mosey Down Main Street events

As a public utility, we feel strongly that we have a responsibility to educate and involve our community. And, we believe that if the public has greater knowledge and understanding of our mission and commitment to the community, they will also feel they have a share in ownership for what we do.

The rebranding effort not only provided an effective way for us to transform our workplace culture by engaging and uniting our staff around a clear and consistent mission, rebranding also allowed us to reach out to and engage the public in partnership for the betterment of the community.

Since the official unveiling of the Lafayette Renew brand and logo in July 2017, the creation of a new website and social media, and our partnerships and involvement in various community events, we believe we have also effectively presented a clear and recognizable public image of our utility as an environmental steward of the community and its water resources.

Going forward, we will continue to foster a culture of growth in our approach to future projects, employee training, and community events, while incorporating strong partnerships in each model. To grow and stay current as a utility, we must embrace new ideas and suggestions and continually improve and re-create ourselves.

Partnering & Engagement

Related to the area of Partnering & Engagement, Lafayette Renew's rebranding effort focused on a series of activities directed toward:

- establishing a collaborative culture by engaging staff in the process of rebranding to reflect our transition from a traditional utility role to a Utility of the Future model.
- uniting all of our staff around the development of a clear, consistent mission statement (and core values) that was created based on their input
- engaging and educating the public as stakeholders in Lafayette Renew and the community we serve
- partnering with community groups and local environmental organizations to advance our mission and goal to provide sustainable facilities and efficiently manage water resources to protect water quality and the environment

These activities included the official rollout of the Lafayette Renew brand and logo at a press conference on July 10, 2017, followed by a planned public rollout to the community at the annual Wabash Riverfest on July 18, 2017.

Rebranding as Lafayette Renew gave our utility a fresh face and provided a new platform that allowed us to engage with community stakeholders at a more direct and higher level. We planned and participated in a variety of activities designed to help the public learn more about the work we are involved in and our commitment to sustainable environmental stewardship to positively impact the quality of life in our community now, and in the future.

- Wabash River Enhancement Corporation (WREC) – Lafayette Renew has partnered with WREC for the past 10 years in presenting the annual Wabash Riverfest in Lafayette. This festival, which began in 2001 as a small racing event on the water, draws large crowds to celebrate the Wabash River and provides an ideal opportunity for us to educate the public about the value and importance of the river as a critical resource to the community.
- Twice annually we also participate with WREC's Wabash River Sampling Blitz. This unique program involves the public in actually sampling and testing the creeks, ditches, and the river in our area. Our employees regularly volunteer to assist with both of these events to interact with and help educate the public about wastewater treatment, stormwater and water quality issues.
- Creation of informational flyers for distribution to the community. These flyers focus on educating the public about utility projects in their area, such as the Brown Street Sewer project which will include green infrastructure features to reduce potential overflows and flooding.
- The Tippecanoe County Partnership for Water Quality (TCPWQ) includes 7 regional entities with a shared MS4 permit. This shared permit allows us to partner on many projects and pool our resources for developing and presenting educational outreach programs to all of our communities. Many educational videos and media spots (commercials) have resulted from this partnership. The partnership has a full-time educator that also works on water quality field days and the Wonders of the Wabash program, an all-day Wabash River raft tour and environmental education program for sixth grade students in the county. Lafayette Renew employees are involved in these presentations and projects.
- #WaterWisdom Campaign – Lafayette Renew works with the City's marketing department to promote Water Wisdom Wednesdays, a program aimed at educating the public about the City's mission to make Lafayette as sustainable and healthy as possible. Lafayette Renew participates in informational sessions that also highlight what we are doing, as well as the impact water has on our community, to encourage the public's involvement in our activities.
- Rain Barrel Program – The Water Pollution Control Department began a rain barrel program 8 years ago as a green environment project to promote the use of rain barrels by residents. The rain barrels continue to be offered by Lafayette Renew at a discount to utility rate payers to encourage usage. This program also inspired a partnership with the Indiana Water Environment Association (IWEA), which established a similar rain barrel program in 2012. Through the IWEA program, which continues to be supported by Lafayette Renew, school students creatively paint rain barrels that are then displayed and put up for a silent auction at the annual IWEA conference. Proceeds from the auction benefit Water For People.
- Classroom Presentations and Tours – Many of our employees are involved in conducting plant tours, classroom presentations, and structured events that allow additional opportunities for education and partnerships.
- Purdue Ecological and Environmental Engineering (EEE) Partnership – Employees at Lafayette Renew have partnered with Purdue's EEE classes to develop rain gardens, bioswales, and various green infrastructure within the community. This program offers an educational component for the students and the owner. Lafayette Renew staff serve as support in Purdue's classroom projects.
- Downtown Event Involvement – Lafayette Renew is involved with several popular community events such as Farmer's Market and Mosey Down Main Street. Participating in these events provides another forum where our employees can talk with residents about Lafayette Renew, which helps to encourage other partnerships and interest in our programs. Furthermore, we are becoming an approachable part of the community.

1. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

We began with a general plan to rebrand our utility to reflect our interest in and commitment to operate in a Utility of the Future model. We took a two phased approach to developing our strategy for the rebranding process. The first phase focused on engaging our staff in the process development and implementation of the rebranding, which included:

- Transforming our existing culture as a traditional utility to move forward as a Utility of the Future
- Meeting with all staff to get their input about the mission, vision and core values of our organization
- Forming employee committees for marketing, industrial and commercial partnering, and education and public outreach

- Cross training staff to help them understand the significance of their job and how it plays into the holistic model of our responsibility, serving the public, as a utility.
- Providing opportunities to obtain certification and improve job performance to participate as an integral part of the team
- Helping staff change from seeing their role as utility workers to environmental professionals and stewards
- Encouraging staff participation in events and activities to engage with the public

The second phase focused on building partnerships with stakeholders in the community, which included:

- Strengthening existing partnerships with WREC, Purdue University, and others
- Developing a marketing plan for announcing the rebrand and unveiling of new logo to the public at the City's annual Wabash Riverfest
- Creating a mailer to send to all rate payers and a brochure about who we are
- Expanding efforts and activities to educate the public about Lafayette Renew and our mission and goals – putting ourselves out there as a vital part of the community
- Implementation of an improved recycling program within our facilities and organization, encouraging the mindset that being a steward of the community and the environment comes with responsibility to set a genuine example and commitment to action.

2. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

The key component of implementation during both phases of our rebranding process was employee involvement. The staff was the driving force in making the partnership programs, as a whole, successful. Although there were some financial components in changing our name and logo (new letterhead, business cards, signs, vehicle decals, updated website) the participation of our staff continues to be the most valuable resource to this ongoing process.

3. Did you partner with other stakeholders or organizations as a part of your implementation process?

The partnering focus initially was with the employees. Partnering outreach to local community groups and other organizations will evolve in our upcoming phases of being a Utility of the Future.

4. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

Vulnerability was a significant obstacle to embarking on this process, since there was no guaranteed success with rebranding, and we had no specific utility-related blueprint for the rebranding process. Without a doubt, having employees onboard with this effort was critical. Historically, it is not the norm for a utility to reach out and want to actively partner with the community in this way. And, it's not something that our employees were accustomed to doing. As a department, we were unsure how this would be perceived by the community. There was no guaranteed success, which made us most vulnerable in this process. Our employees' cooperation and heavy involvement proved to be the key success factor. Once we realized this, approaching other partnerships became easier. The public seemed to embrace the new Lafayette Renew, as we became more approachable.

5. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

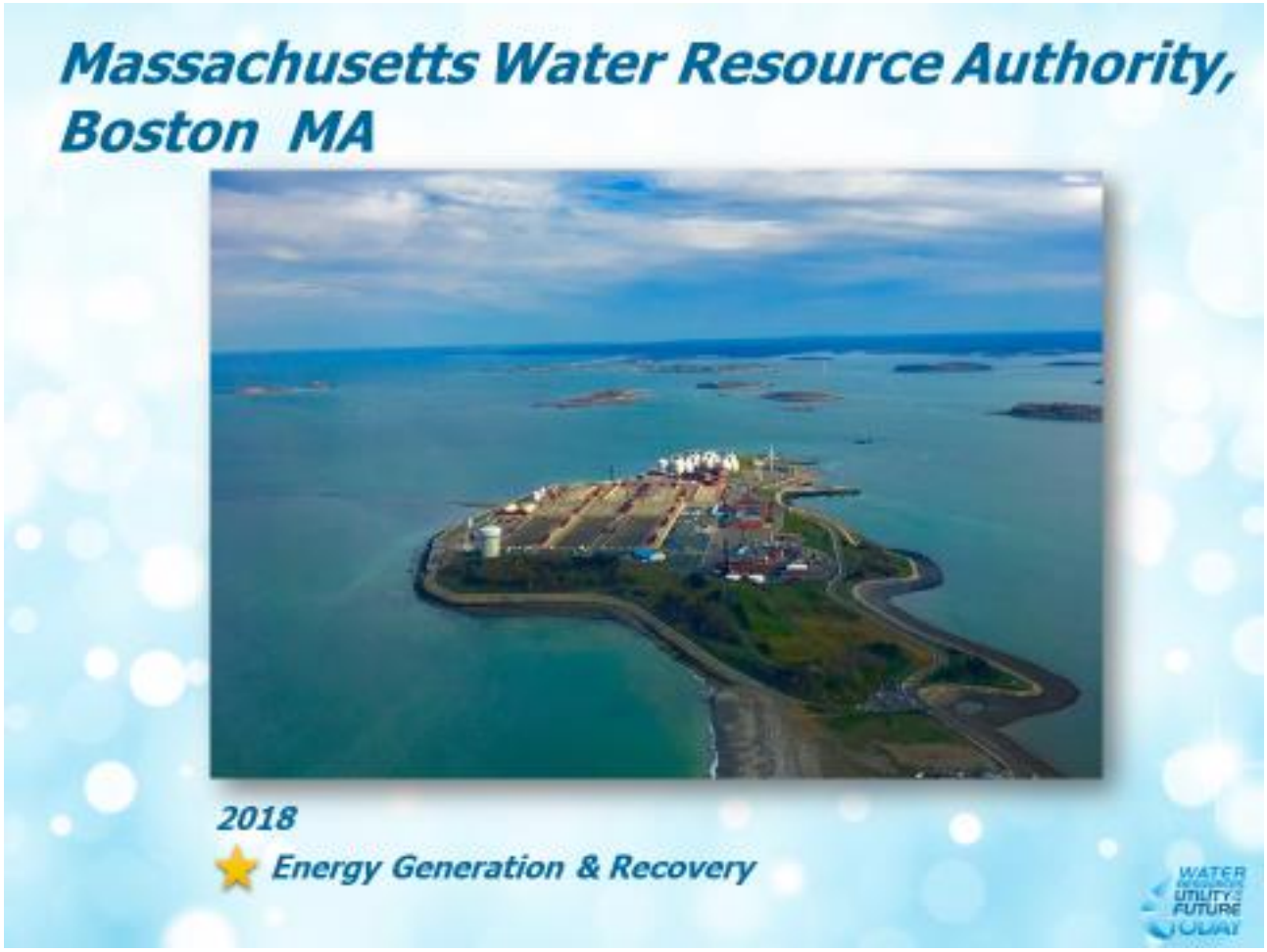
Lafayette Renew has expanded outreach to engage the public through our updated website and the city's social media sites, including sharing project photos, videos, drone images, and a Q&A document to educate and engage the public. Through the website and our various social media sites, we've become more approachable, highly accessible, and "real," since the public can now feel more involved by following us or commenting on our posts. Social media helped to provide a sense of being unofficial partners with the public, and that they are now included in our processes. In addition, there

are often silent partnerships with the media. Our web page and social media outreach is used by local news teams to develop stories. We are called for comments that stem from our educational outreach.

6. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

   Lafayette Renew's website: https://www.lafayette.in.gov/329/Lafayette-Renew
   City of Lafayette Facebook page: https://www.facebook.com/LafayetteIN/
   City of Lafayette Twitter page: https://twitter.com/City_Lafayette?lang=en
   #LafayetteRenew Twitter posts: https://twitter.com/search?q=%23lafayetterenew&src=typd

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Rebrand Perception and Impact	Positive perception by public	We received numerous positive comments on our new name and logo
Impact on Community and Responsiveness	To have greater visibility/good reputation. Be available for questions	Employees have noticed that they are more approachable and better received in discussions with the public on the street.
Public Engagement	An Increase in community volunteering and partnering with our department	Feedback/suggestions from the community have increased via phone calls and social media comments.
Employee Satisfaction	Positive employee involvement	Employees are more engaged in daily duties and have a new sense of pride and ownership in tasks, often offering new suggestions.
Awards & Recognition	Magazine articles and/or awards each year.	Increase in featured articles, awards and recognition.
Certification Rate	New employee certification	Eleven new or advanced employee certifications in the last year.
Employee education	Additional employee requests for seminars/education	Additional schooling/seminars added at employee request.



Utility Description (combine all plants if a multi-site system)		
Utility Name: **Massachusetts Water Resources Authority**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional System (Drinking Water and Wastewater Utility with plants, pi)		
Service Area (square miles): 61 communities in eastern Massachusetts	Average Annual Daily Flow or Demand (MGD): 350 MGD wastewater, 200 MGD drinking water	
Population Served: 2.5 million		
Location		
Street Address: 100 First Ave Building 39		
City: Boston State: Massachusetts	Country: USA	
Zip Code/Country Code: 02129		
Utility Representative Contact Information		
Name: Ethan Wenger	Phone: 617-660-7689	Email: Ethan.wenger@mwra.com

Organizational Culture

The Massachusetts Water Resources Authority (MWRA) is a Massachusetts public authority created by an act of the Legislature in 1984 to provide water and sewer service to over 2.5 million people and more than 5,500 industrial users in 61 metropolitan Boston communities. MWRA's mission is to provide reliable, cost-effective, high-quality water and sewer services that protect public health, promote environmental stewardship, maintain customer confidence, and support a prosperous economy. MWRA operates with a total budget of over $700m.

MWRA is closely engaged in the communities it serves. Eight of its 11-member Board of Directors are appointed directly or indirectly by these communities, while the other three are appointed by the Governor. In addition the MWRA Advisory Board (made up of a representative from each MWRA community) reviews and comments on MWRA's budget.

The leadership team at MWRA consists of the Executive Director (Frederick Laskey), a Chief Operating Officer (David Coppes), and a core group of Division Directors. This team sets the policies under the direction of the MWRA Board. The leadership team has encouraged a policy of clear and rapid communication, particularly of significant process and public events (such as water breaks for example, or a plant process failure of some kind). Staff use pre-set e-mail lists to rapidly spread information to executives and key staff. These lists are also used for safety events (employee being sent to the hospital) or security incidents (vandalism for example).

MWRA works closely with its ratepayer community on issues of importance to its members' values. For example when lead in water reemerged as a priority after the incidents in Flint, Michigan, MWRA provided $100 million in interest-free loans to its member communities to fully replace lead service lines in 2016. There is also a vibrant school program managed by MWRA. This culminates in an annual poster/essay contest where children from schools throughout MWRA's member communities are awarded for the best representation of a chosen clean-water topic.

Of course employee development is an important part of organizational culture. MWRA's goal is to staff at a maximum of 1150 full-time employees with a goal of promoting internally whenever possible. MWRA provides supervisory training to its supervisor/manager staff and those who are interested in becoming supervisors. In addition its managers participate in a week-long leadership course at a local university to ensure that more senior staff are given appropriate guidance in leading departments and divisions within the organization. On-the-job training is provided to staff who are interested in learning new skills, particularly in the areas of wastewater operations and mechanics. As a result of such programs, approximately half of the 56 positions vacated in the last year were filled internally, and it is anticipated that and additional 10% will be filled internally in the next several months. Some of these programs are taught by staff who volunteer to lead them out of an interest in seeing staff learn new skills.

MWRA encourages collaboration with other utilities, predominantly through member organizations such as NEWEA, AWWA, NACWA, and WEF. A number of deputy directors and directors routinely present MWRA's work at conferences and exchange ideas with other utilities, and participate on committees. For example the new Chief Operating Officer, David Coppes, has served as a member of the drinking water licensing board for Massachusetts since 2012.

Work-place safety is another high priority for all MWRA employees. MWRA's confined space training program is employee-taught and trains over one hundred staff per year. Staff receive safety training on the day they start at MWRA, and contractors working at MWRA's Deer Island Treatment Plant receive safety training before they are allowed to work on-site. Safety procedures were recently updated in an employee-led effort that brought staff together from various work locations to update and revise the documents.

Finally, MWRA believe in celebrating its achievements and awarding its employees when they make improvements. In 2018 MWRA presented a number of staff with awards, who contributed to a significant cost-saving measure in the Deer Island Valve Replacement Contract. Staff came up with an idea that made it unnecessary to shut down Deer Island's largest pump station numerous times as originally planned, saving thousands of dollars and reducing the likelihood of potential environmental harm from possible sanitary sewer overflows. MWRA is also is the proud recipient of the NACWA platinum award, and has gone for 11 years without permit violations at its Deer Island facility. Staff take an annual photo each year to recognize this joint achievement.

Energy Generation & Recovery

The MWRA has installed a variety of renewable energy technologies to ensure the Authority reaches the goals established by former Governor Patrick's Executive Order 484 and to reduce the Authority's greenhouse gas footprint. The MWRA continues to evaluate new renewable energy technologies and potential applications at their sites across Massachusetts. To date, the MWRA has installed the following renewable energy projects:

- Wind Turbines
  - Two 600kW wind turbines were installed at Deer Island.
  - One 1.5 MW wind turbine was installed at the DeLauri Pump Station.
- Solar
  - One 496 kW solar array was installed at the John Carroll Water Treatment Plant.
  - Four solar arrays were installed at Deer Island including one 100 kW rooftop array on the Residual Odor Control building, one 180 kW rooftop array on the Maintenance Warehouse building, one 222 kW rooftop array on the Grit building, and one 234 kW ground mount array.
- Hydro
  - Two 1 MW hydro turbines that utilize the outflow to the Boston Harbor were installed at Deer Island.
  - One 3.5 MW hydro turbine was installed at the Oakdale Transfer Station.
  - Two 1.7 MW hydro turbines were installed at the Cosgrove Aqueduct.
  - One 200 kW hydro turbine was installed at Loring Road Covered Storage facility.
  - One 60 kW hydro turbine was installed at the William A. Brutsch Water Treatment facility.
- Methane
  - Methane generated from the sludge digestion process is collected and used in Deer Island's on-site power plant to create steam that supplies hot water and heat for the facility. The steam is also run through a steam turbine generator that produces electricity. The on-site power plant consists of one steam turbine generator and one back pressure steam turbine generator which together produce approximately 3.5 MW of electricity

g. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

The MWRA has installed renewable energy since the creation of the Authority. The MWRA owns a large amount of land, buildings, and infrastructure that provides ample room to construct renewable energy projects. The MWRA looks for ways to utilize their existing resources, such as biosolids and water, to create energy thus minimizing cost and maximizing energy output. The MWRA has conducted multiple feasibility studies for renewable energy throughout their facilities. The feasibility studies evaluate site conditions, grants and funding, as well as necessary permits to determine whether or not it is economically and operationally feasible to install renewable energy technology on-site.

h. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

The MWRA has a dedicated energy team of three full time staff, who are involved in implementing renewable energy projects. In addition to this team, many other parts of the Authority are involved with the implementation and construction of renewable energy projects such as operations and engineering. The MWRA has spent approximately $90 million on the construction of renewable energy projects. In addition, the MWRA has received approximately $50 million in funding from state and federal grants.

i. Did you partner with other stakeholders or organizations as a part of your implementation process?

The MWRA has partnered with consultants and developers to evaluate and construct renewable energy projects across the Authority. In addition, the MWRA partnered with a solar developer through a power purchase agreement (PPA) at Deer Island for the construction of two of the solar arrays. The PPA has allowed the Authority to buy renewable energy and offset electricity demand while being able to access federal tax incentives, such as the Investment Tax Credit (ITC).

Furthermore, the Authority has partnered with state agencies, such as Leading by Example and the Massachusetts Clean Energy Center, to help study new technologies and fund their construction.

j. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

The most critical obstacle with constructing renewable energy projects was the upfront financial costs of the projects. The MWRA has overcome this obstacle by pursuing state and federal grants and participating in PPAs that allow federal tax incentives to be applied to the project costs and passed through to the Authority through reduced energy payments. Furthermore, the Authority has begun to evaluate the economics of renewable energy projects through both a simple payback method as well as the life-cycle cost assessment which looks at the full benefits and costs throughout the lifetime of the project as opposed to just the upfront cost.

k. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

"Smart" information technology has supported the implementation and optimization of renewable energy projects at the MWRA through the use of smart metering and controls. Smart metering and controls enable real-time monitoring and control of all renewable energy assets. This real-time monitoring and control of renewable energy assets allows the Authority to diagnose and troubleshoot problems with the assets as well as to monitor their operations and ensure maximum energy output.

l. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

The MWRA's website (mwra.com) includes information on energy efficiency improvements.

Performance Measures & Results:

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Green energy production at Deer Island as a % of total power demand	27% in Fiscal Year 2017	27.3% in FY17, 27.4% 3-year average
% of digester gas utilized	98%	97.5% in FY17, 98.3% 3-year average
Solar capacity at MWRA	Increase solar capacity at MWRA	Installed 1.2 MW of solar capacity
Wind generation at MWRA	Increase wind generation	Installed 2.7 MW of wind generation

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Metro Wastewater Reclamation District**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, storm water, etc.): **Regional System**		
Service Area (square miles): **715-square-miles**	Average Annual Daily Flow or Demand (MGD): **130 MGD**	
Population Served: **1.8 million**		
Location		
Street Address: **6450 York Street**		
City**:** **Denver** State**:** **CO**	Country: **USA**	
Zip Code/Country Code**:** **80229**		
Utility Representative Contact Information		
Name: **Kelley Merritt**	Phone: **303-286-3455**	Email: **kmerritt@mwrd.dst.co.us**

Organizational Culture

Formed under Colorado law in 1961 to serve the Denver metro area and protect the South Platte River, the Metro Wastewater Reclamation District (Metro District or District) is the largest water reclamation provider in the Rocky Mountain West. The Metro District provides wholesale wastewater transmission and treatment service to 60 local

governments, including cities, sanitation districts, and water and sanitation districts. They, in turn, provide retail wastewater service to about 1.8 million people in a 715 square-mile service area in metropolitan Denver.

The Metro District collects and reclaims about 130 million gallons of wastewater and generates nearly 90 dry tons of Class B biosolids per day. For the majority of the year, most of the water in the South Platte River comes from the outfalls of the Robert W. Hite Treatment Facility in Denver, Colorado.

Protecting public health and the environment in the communities where we live and work is the reason for the Metro District's existence. Our commitment to this purpose is proudly shared by nearly 400 employees and directly stated in our mission: To protect the region's health and environment by cleaning water and recovering resources.

The culture of the organization is also central to the Metro District's strategic vision captured in our Strategic Plan: To be a responsible leader, an innovative clean water partner, and a great place to work. The District has a fortunate history of long employee tenure. It is not unusual for employees to celebrate 30 or 40 years with the District before retiring. We are incredibly proud of our dedicated workforce and the organization-wide commitment to the collective values we share:

- **Integrity:** Doing the right thing
- **Collaboration:** Partnering with internal and external stakeholders to serve the region
- **Professionalism:** Providing high-quality products and services and being considerate of colleagues, connectors, stakeholders, and customers
- **Stewardship:** Embracing the District's role and responsibility to protect public health and water quality in the Denver Metro area
- **Empowerment:** Providing employees with the resources, open communication, and opportunities to enhance their careers and quality of work
- **Commitment:** Dedicating the District to delivering dependable services
- **Innovation:** Committing to the development of a culture of innovation at all levels

The importance of organizational culture is reflected throughout the Metro District's updated Strategic Plan adopted by the District's Board of Directors in 2016. Many of the goals identified through the strategic planning process emphasize the critical role of our collaborative workplace culture. As a result, several significant organizational changes have been implemented to position the District as an employer of choice and also promote a culture of innovation. Two new departments were recently created – the Human Resources Department and the Strategy and Innovation Department.

By elevating the Human Resources Division to its own department in 2016, we enhanced our ability to retain and attract an effective, motivated, and high-performing workforce. Accordingly, these expanded Human Resources capabilities have allowed the Metro District to better motivate, manage, and reward our exceptional employees who make significant contributions to the performance and success of the District as a whole.

Through the formation of a new Strategy and Innovation Department, we created new organizational capacity to inspire infinite ideas that extend the value of finite resources. Our new Strategy and Innovation team has provided a space within the organization to explore and develop the most promising ideas, emerging technologies, and industry trends that may improve performance, reduce cost, or improve sustainability in the region. By embracing innovation, we build more certainty by investing in our future.

The organizational realignment that started in 2016 continued the following year when an existing department was dissolved and the Operations Department and the Maintenance Department were created. Through the transition, the Resource, Recovery, and Reuse Department was expanded and now includes the operational responsibilities for the Transmission Division, along with the Biosolids Management Program. These refinements have already begun to optimize the District's day-to-day operations, further empower our workforce, and increase collaboration between departments.

The emphasis placed on organizational culture by the Metro District is best exemplified by the following initiatives, programs, and guiding principles:

- **Leadership Commitment:** Our integrated and well-coordinated senior management team is led by our District Manager and accountable to a diverse Board of Directors that has consistently demonstrated a commitment to regional collaboration and employing an industry-leading workforce.

- **Community Values:** The District's commitment to being a good neighbor is evident throughout our business and operational planning process with dedicated community and employee engagement teams for major projects, such as the recently opened Northern Treatment Plant and the current design phase of the new Second Creek Pipeline. The District also maintains close connections to Colorado's agricultural community and the dozens of independent farmers we partner with through our Biosolids Management Program.

- **Workforce/Leadership Development:** Our Human Resources Department implements a number of formal and informal initiatives designed to meet our employer of choice goals. These efforts include an education reimbursement program for tuition, text books, and other undergraduate and graduate course costs. The District's internal hiring practices resulted in the promotion of approximately 30 highly qualified internal candidates in 2017.

- **Continual Learning and Training:** District staff recorded approximately 4,620 hours of workforce development instruction in 2017, including supervisory training, safety and compliance training, and instruction regarding the organization's best practices and policies.

- **Industry Leadership:** The District pays close attention to advancements in water reclamation science, and we rely heavily on our workforce to help develop the latest industry innovations and technology. The District commits annual budget resources for employee attendance at industry conferences, and staff members fill a number of leadership roles for industry organizations, such as Co-Chair of the NACWA Biosolids Committee.

- **Employee Engagement:** The District is committed to an ongoing dialogue with our team to better understand how we can make a great place to work even better. We routinely gather staff input through a variety of in-person and digital communications. In 2017, focus groups and town hall meetings were conducted with more than 150 employees. In addition, nearly 90% of our staff voluntarily responded to a recent employee engagement survey.

- **Integrated Organizational Communications:** As part of the District's dedication to continuous improvement, a systematic planning process was initiated in 2018 to identify a comprehensive internal and external communications strategy with significant opportunities for participatory and collaborative employee engagement.

- **Employee Recognition:** The District appreciates the individual and collaborative efforts of our employees who work hard every day to protect public health, wildlife, and the environment. We recognize our talented workforce year-round through numerous activities and events that include the Ideas at Work Program, Chairman's Award, Employee Recognition Reception with the Board of Directors, Service Awards, Safety Awards, Spot Awards, and an employee celebration during Wastewater Worker Recognition Week.

- **Workplace Safety:** All employees have a part in the District's active health and safety program that focuses on anticipation, recognition, evaluation, and control of hazards. Key components include written procedures and associated training in emergency preparedness, control of hazardous energy, confined spaces, hazard communication, personal protective gear, and operation of equipment.

- **Workplace Wellness:** The District is one of only 250 Colorado businesses recognized by Health Links™ as a Certified Healthy Business Leader – the highest program level awarded for excellence in workplace health and safety. This was achieved through our demonstrated commitment to workplace wellness programs that

promote healthy behaviors, such as banning tobacco use by employees or contractors on company property. Currently, about 50% of our employees participate in a variety of events and activities, including an annual health fair, fitness activity reimbursements, webinars, seminars, and fitness challenges.

Beneficial Biosolids Use

The Metro District is nationally recognized as a clean water leader and innovator in the field of beneficial biosolids use. We have been pioneering proven water reclamation technologies and resource recovery for more than 50 years.

In 1977, the Metro District committed to a beneficial use program through the creation of the Resource Recovery and Reuse Department (RR&R). For more than 40 years, the RR&R Department successfully produced both a Class A compost product along with a Class B biosolids product. As our program evolved over the years, we eventually discontinued the public sale of compost to leverage the operational economies of scale provided by a singular focus on Class B agricultural applications.

In 2005, the Metro District became the 8th agency nationwide to receive certification for our Biosolids Management Program (BMP) – which reflects the best practices and principles of the National Biosolids Partnership. The program is designed to meet several District goals:

- Establish standard procedures and steps for biosolids management
- Optimize effectiveness of operational performance
- Ensure regulatory compliance
- Develop community and industry partnerships
- Advance environmentally sound and sustainable biosolids management practices that exceed regulatory compliance

Through a combination of decades-long initiatives and emerging innovative programs, the Metro District effectively recaptures valuable nutrients and energy from wastewater and transforms them into environmentally and economically successful business practices. In addition to co-generating enough energy on-site to power approximately 35% of our facilities and provide 100% of our process heating requirements, we annually produce 30,000 dry tons of Class B biosolids known as METROGRO®. The registered trademark fertilizer is beneficially used to meet the agronomic nitrogen needs for agricultural applications.

To achieve our goal of beneficially using 100% of our biosolids production, the Metro District land applies nearly 35% of our biosolids at the 52,000-acre METROGRO Farm in Deer Trail, Colorado – which we own and operate. On Metro District land, RR&R staff manages the entire cycle. Once the biosolids have been applied, staff then manages the planting, growing, harvesting, marketing, and sale of the wheat produced by the program. We also land apply nearly 65% of our biosolids production at private agricultural sites in five counties in eastern Colorado.

The Metro District recovers an average of nearly 20% of our total annual biosolids management operating costs through the sale of harvested METROGRO Farm crops – which include winter wheat, sorghum, and corn. The District recovers additional operating costs through the sale of METROGRO® fertilizer to private farmers and also leases pasture areas for cattle grazing.

Research has proven that beneficial use of biosolids is safe and provides substantial environmental benefits while producing better crop yields. To ensure the Metro District meets or exceeds regulatory compliance, the United States Geological Survey (USGS) has conducted comprehensive independent research on our METROGRO Farm for 25 years and continues to do so based on quarterly sampling of soil, water, and crops. Our Biosolids Management Program has proven to be a sustainable and cost-effective option for long-term beneficial biosolids use.

The Metro District recently completed a greenhouse gas (GHG) inventory analysis of all of its Scope 1-3 Emissions and offsets of GHGs. Emissions associated with land application (i.e., biosolids transport to land application sites and spreading of biosolids) equate to 1,831 metric tons of CO2e annually; however, the avoided emissions (e.g., offsets) due

to avoided chemical fertilizer use and carbon sequestration are equal to -13,901 metric tons of CO2e. Therefore, the emissions associated with land application produce a net benefit of -12,070 metric tons of CO2e annually to the overall GHG inventory impact of the utility.

How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
The Metro District has been successfully implementing its biosolids program for more than 40 years. We pioneered the sustainable production of biosolids for agricultural soil reclamation applications. As with any major initiative, our Biosolids Management Program began on a smaller scale and has evolved over time.

To ensure the quality of the biosolids and the land application process, the Metro District made the decision to manage all components of the biosolids program with internal staff and equipment. District staff is responsible for permitting, sampling, transporting, and applying METROGRO® fertilizer. Over the years, the District staff has actively engaged the agricultural community near the METROGRO Farm and at private application sites. Initial marketing efforts included neighborhood picnics, newsletters published in the local paper, and stakeholder meetings.

What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
As the Metro District's Biosolids Management Program grew and matured, the amount of dedicated staff and financial resources grew along with it. What started as a staff of two or three now comprises a biosolids team of 45. The diverse group includes tractor-trailer operators, heavy equipment mechanics, regulatory staff, and crop and soil scientists. Along with the Biosolids Management Program, the RR&R Department's total operating budget now includes the Transmission Division and has grown to approximately $13 million annually.

Did you partner with other stakeholders or organizations as a part of your implementation process?
The Metro District's Biosolids Management Program continually partners with a growing number of diverse stakeholders. Our primary strategic partnerships include:

- **Regulators:** The District works closely with the U.S. Environmental Protection Agency (EPA) and the Colorado Department of Public Health and Environment (CDPHE) to regulate the production and distribution of METROGRO biosolids for the protection of public health and the environment.

- **Educators:** The District works closely with local school districts to conduct regular tours of its facilities. Additionally, starting in 2012, the District initiated an annual professional development class titled "Wastewater and Renewable Resources". The class is attended by 15-20 teachers annually and participants are eligible to receive a 0.5 semester hour of continuing education credit from the Colorado School of Mines.

- **Farmers:** In addition to our 52,000-acre METROGRO Farm, the District partners with 30 independent farmers to beneficially use our biosolids on more than 10,000 acres of agricultural land at approximately 68 private sites. We also participate in agricultural conferences every year, such as the Colorado Conservation Tillage Association and Colorado Livestock Association.

- **Industry Associations:** The District is actively involved in many water reclamation and biosolids industry associations. We also participate in a variety of industry conferences conducted by organizations such as the Water Environment Federation, the Water Research Foundation, and the Rocky Mountain Water Environment Association.

- **Community Stakeholders:** The District continually conducts a wide-range of community outreach events to educate the public about the beneficial use of biosolids, as well as the full spectrum of water reclamation activities. We host an open house and stakeholder meeting annually at the METROGRO Farm and also present at multiple water festivals attended by local students.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

Public perception about the production, application, and safety of beneficial biosolids use is likely the greatest obstacle facing the industry. Over the years, the keys to successfully overcoming this challenge for the Metro District have been integrated stakeholder education efforts, including community events, media relations, partner coordination, and a rigorous and evidence-based regulatory compliance program. By continually gathering the best available data and contributing to emerging science, we work closely with our partners at the EPA, CDPHE, and USGS to be at the leading edge of industry best practices and innovation for beneficial biosolids use.

This data-driven approach provides an extraordinarily strong foundation for stakeholder education. Through decades of research, we have proven that biosolids are safe and provide substantial environmental benefit, while also producing better crop yields. For example, the comprehensive independent research conducted by the USGS on our METROGRO Farm is based on quarterly sampling and does not show any difference between the soil, water, and crops on the farm and other agricultural operations in the area.

Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
Similar to other large-scale agricultural organizations, technological advances are playing an increasingly important role in the efficiency of the Metro District's operations. A few of our most recent technology innovations include:

- **Global Positioning Systems (GPS):** The District recently implemented a new GPS mapping program that allows us to track biosolids applications within a two-inch margin of error, so we know exactly when and where our product is being applied.

- **Unmanned Aerial Vehicles (Drones):** The District is currently conducting a drone pilot program on our METROGRO Farm. This innovative new effort allows us to monitor, evaluate, and verify crop health on our entire 52,000-acre operation with greater precision than ever before, and for a fraction of the staff and operational resources previously required.

- **Logistics:** To further advance our precision tracking and evaluation of every element of the District's Biosolids Management Program, we have outfitted all 18 tractor-trailers in our transportation fleet with electronic logging and tracking systems. Through this effort, we collect real-time data during transit from our two water reclamation facilities to ensure our biosolids product is safely and efficiently delivered and in compliance with Colorado Department of Transportation CDL driver requirements.

Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
More information about the Metro District's beneficial biosolids use can be found through the following resources:

- Biosolids Management Program: http://www.metrowastewater.com/know/BenReuse/Pages/BiosolidsManagementProgram.aspx
- METROGRO Farm: http://www.metrowastewater.com/aboutus/Pages/facilities.aspx
- 2016 Annual Report: http://www.metrowastewater.com/aboutus/metroreports/2016_MWRDAnnualReport_sm.pdf
- Local Media (sample article from 5280 Magazine): http://www.5280.com/2014/05/waste-not/

Performance Measures and Results

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*

Resource Recovery: Beneficial Biosolids Use v. Total Production	100% of total production	100% of total production (30,000 dry tons annually)
Financial Performance: Biosolids Management Department Cost Recovery from Sale of METROGRO Crops and Fertilizer	2016: 10% 2017: 10% 2018: 10%	2016: 18% (exceeded goal) 2017: 19% (exceeded goal) 2018: On target
Operational Performance: METROGRO Farm Crop Protein Content	Average ordinary wheat protein content: 11%	2016: METROGRO wheat protein content: 11.2% 2017: METROGRO wheat protein content: 14%
Regulatory Compliance	100% regulatory compliance	100% regulatory compliance
Stakeholder Partnerships	Maximize private farmer participation to achieve 100% beneficial use of annual biosolids production (30,000 dry tons)	Met goal: • 65% of total production • 30 independent farmers • 10,000+ acres • Approximately 68 sites
Operational Safety	Zero staff injuries/incidents	Zero staff injuries/incidents

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Napa Sanitation District (NapaSan)**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): **Collection system, combined wastewater treatment plant and water recycling facility, and recycled water distribution.**		
Service Area (square miles): **21.7 square miles Sewer Service / 31.3 square miles Recycled Water**		Average Annual Daily Flow or Demand (MGD): **10 MGD**
Population Served: **82,700**		
Location		
Street Address: 1515 Soscol Ferry Road		
City: **Napa**	State: **California**	Country: **United States of America**
Zip Code/Country Code: **94558-6247**		
Utility Representative Contact Information		
Name: **Jeff Tucker**	Phone: **(707) 258-6012**	Email: **JTucker@NapaSan.com**

Organizational Culture

The Organizational Culture for Napa Sanitation District (NapaSan) starts with its mission, to "collect, treat, beneficially reuse and dispose of wastewater in an effective and fiscally responsible manner that respects the environment, maintains public health, and meets or exceeds all local, state and federal regulations."

Our Strategic Plan identifies resource recovery as one of NapaSan primary goals, with the Board regularly establishing objectives and projects for achievement and advancement of this goal, while also emphasizing important Effective Utility Management key attributes, including reliability, financial stability, operational optimization, employee development and community outreach and engagement.

Eight years ago, NapaSan fully embraced the Effective Utility Management framework for the evaluation and continuous improvement of its operations. NapaSan was one of the first agencies in the county to use the 10 Attributes of Effectively Managed Water Sector Utilities as a framework for establishing 63 key performance indicators that have been measured, evaluated, reported to the Board and the public, and used by NapaSan management to determine where investments of time and resources are necessary to improve operations.

We recognize that in a highly competitive marketplace such as the San Francisco metropolitan area, if we are to have highly trained and skilled wastewater operators, lab analysts, and collection system workers in the future, it is our responsibility to develop those individuals now. In partnership with local community colleges, NapaSan has developed an Operator-in-Training program where individuals with minimum college coursework in water/wastewater operations can receive up to 1,800 hours of training at our Class V treatment and water recycling facility, under the direct supervision of highly skilled, experienced operators. Even though we have only 9 certified operators in total, we have developed a program to train up to 6 operators-in-training at any given time on all aspects of treatment. Additional efforts are made throughout NapaSan to bring in high school and college interns in engineering, laboratory analysis and collections, to introduce students to the possibility of careers in water.

The NapaSan Board and executive leadership believes in and actively promotes participation of employees in professional organizations and activities that promote training and education, along with technological advancement and information dissemination. For example, one of NapaSan's directors served the California Water Environment Association (CWEA, the California member association of WEF) on its Executive Board as the Treasurer, and was the liaison to the CA-NV AWWA Section to develop a joint Advanced Water Treatment Operator Certification program that will be necessary with the development and permitting of indirect and direct potable reuse treatment facilities. Additionally, a NapaSan director currently serves as the vice-chair on the Bay Area Clean Water Agencies (BACWA) Collection Systems Committee. Several other NapaSan staff has served on the board of the CWEA Local Section, providing education and other services to members. NapaSan's safety officer has been actively involved in coordinating the region-wide Northern Safety Day, providing safety and collection system training to hundreds in the Northern California area. And engineering staff has been actively engaged in the local Napa Engineering Association. NapaSan even funds several scholarships through the Napa Engineering Society to aid students who are interested in water professions in getting their engineering or science degrees.

These efforts to train and develop both new and existing employees in the water profession are so important that the NapaSan board has included this as an objective in its Strategic Plan (Objective 4A), and annually evaluates the General Manager on NapaSan's efforts.

The organizational culture at NapaSan actively encourages technological innovation as well. NapaSan has participated in a number of pilot studies and academic studies to evaluate new technologies, most recently working with Dr. Kati Bell, P.E. (Stantec) and others on a WRF study (LIFT14T16) to use peracetic acid for disinfection of both activated sludge treated and oxidation pond treated wastewater, and also contributing on the Advisory Board for WRF Project 4718 "Battery Storage System Guidance for Water and Wastewater Utilities."

NapaSan maintains an internal awards program, called the Darcy Aston Innovation Award, where managers and supervisors nominate staff for specific innovative programs or inventions. In the last two years, there have been 26 nominations. All of the projects nominated are highlighted at a District-wide "all hands" meeting, and the top three nominations each year are given awards at the Annual Awards Banquet. And last year, one of the projects was nominated for a CWEA "Gimmicks and Gadgets" award and took third place in the state-wide competition.

Innovation doesn't stop at the borders of our agency. NapaSan staff regularly present at professional conferences and trainings on the innovative projects in which we are engaged. Staff has presented at WEFTEC, Utility Management Conference, CWEA annual and regional conferences, WateReuse California Conference, and BAYWORK specialty trainings. Topics have included performance measurement using the EUM framework, collection system rehabilitation strategies, setting up Operator-in-Training programs, activated sludge impacts from an earthquake, asset management, and the use of LiDAR to assist equipment rehabilitation in the treatment plant, among others.

Most importantly, the organizational culture at NapaSan is one that promotes excellence in meeting regulatory requirements within a safety-first work ethos. The NapaSan treatment plant has not exceeded its NPDES discharge limitations in over 15 years. In a recent audit by its Worker's Compensation insurance provider, NapaSan exceeded the average of its peer agencies in 52 of 56 applicable policy categories. NapaSan is Lost-Time Accident Free since April 15, 2015, and at EVERY Board meeting, we report on the agenda our lost-time record.

In the next section of the application, we describe NapaSan's efforts related to water reuse, but this is in no way the only Activity Area in which NapaSan excels. We are engaged in the beneficial reuse of biosolids through land application and active farming. We generate approximately half of our energy needs through the conversion of biogas to energy and the use of solar power, along with taking active measures to improve energy and chemical efficiency. We actively engage with community partners and stakeholders in the delivery of recycled water, public educational programs, a Citizens Academy, and development of new services based on customer and stakeholder feedback. The NapaSan Board, its executive leadership, and employees throughout the organization are committed not just to meeting current regulatory requirements in collection and treatment, but in becoming a full resource-recovery facility that is engaged with its customers and stakeholders to help lead the local community and the wastewater professional community into the future.

Water Reuse

Through planning and then implementing its S*trategic Plan for Recycled Water Use in 2020* (August 2005), NapaSan has expanded its capacity to treat wastewater to "Title 22 Unrestricted" tertiary-disinfected quality and to distribute that water to the surrounding community for agricultural use, landscape irrigation and other beneficial uses. NapaSan now owns, maintains, and distributes recycled water through 26 miles of main line to a recycled water service territory of over 31 square miles, compared to NapaSan's sewer service territory of about 21 square miles. In 2017, NapaSan delivered 2,165 AF (705 million gallons) of recycled water into the community, which represents over 20% of total annual flows into NapaSan and about 58% of all summer (May-Oct) flows in 2017.

a. **How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?** The recycled water system was initially developed in response to NPDES non-discharge requirements imposed by the Regional Water Quality Control Board in the 1980's, and in cooperation with the City of Napa to allow NapaSan to distribute recycled water in the city's water service territory. Once that system was completed (around 2005, with 10 miles of pipeline), NapaSan partnered with Napa County and the Los Carneros Water District (LCWD) on a significant system expansion as a response to groundwater and surface water deficiencies in the rural, agricultural areas. Working through a multi-jurisdictional partnership (the North Bay Water Reuse Authority), NapaSan, Napa County and the LCWD secured federal grants, state grants, and low-interest loans to finance the system expansion.

b. **What type and amount of resources were needed to support implementation?**
The significant expansion of the recycled water system in the past ten years came about through the full engagement of staff at multiple agencies, including management. Finance and engineering staff at NapaSan, management and finance staff at Napa County, and volunteers from the LCWD were necessary to implement this project. There were 2 state loans, 2 state grants, and 4 different federal grants associated with this project that needed application, oversight, accounting and reporting, as well as the project management and engineering efforts to plan, design and build the projects.

c. **Did you partner with other stakeholders or organizations as part of your implementation process?** Multiple partners and stakeholders were necessary for this project. NapaSan partnered with 7 other agencies in the three-county area of the North Bay to complete an Environmental Impact Statement/Environmental Impact

Report for expansion of recycled water, and to secure funding from the US Bureau of Reclamation. NapaSan partnered with the City of Napa to purvey recycled water in their water service territory. Napa County created a Community Facilities District to fund recycled water in the MST area, while the LCWD assessed property owners to expand into the Carneros region. LCWD partnered with NapaSan on two other federal grants from different federal agencies, and NapaSan, LCWD and Napa County jointly worked with the State Water Resources Control Board on grants and low-interest loans.

d. **What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?**
The most difficult part of expanding the recycled water distribution system was ensuring that there would be users of the recycled water once the system was built. To obtain grant funding and project loans, it was necessary to demonstrate that there would be future users of the recycled water system. This was accomplished in the Napa County MST area through the creation of a voluntary Community Facilities District (CFD). Properties that were adjacent to the new pipeline could connect and use recycled water only if the land owner voluntarily annexed into the CFD. The voluntary nature of the CFD pleased the area residents in that no one was forced to enter into (and pay for) the CFD if they didn't want or need the recycled water, while the voluntary nature of the CFD gave assurances to grantors and the loan originators that there would be adequate demand for recycled water. In the LCWD area, this was similarly accomplished through a vote of property owners to self-assess themselves a property tax, with the high turnout rate and high level of voter support indicating strong demand. These results were due to the diligent, time consuming efforts of staff, consultants and volunteers holding community meetings and one-on-one meetings with land owners to discuss the community benefits of the project and personal benefits of hooking up to and using recycled water.

e. **Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.** The recycled water distribution system in the LCWD area incorporated "Smart" meters. These meters and the supporting software infrastructure allow irrigation customers in this area to get almost real-time water usage data. This access to data can help managers of these properties manage water usage, evaluate the effectiveness of any conservation efforts, and help identify any water leaks long before the customer is billed for the water use. As water meters in the rest of the NapaSan recycled water distribution system need to be replaced, they are being replaced with "smart" meters so that eventually the entire network of pipelines and meters will be integrated into this system.

f. **Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?** NapaSan produced a short (less than 5 minute) video that describes the need for and accomplishments of the recycled water expansion program, which can be viewed at https://vimeo.com/178341865. The entire recycled water program is presented on the NapaSan website: http://www.NapaSan.com.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
% of wastewater converted to recycled water (May-Oct)	50%	58% in 2017
% of recycled water treated sold to customers	70%	83.1% in 2017
Recycled water demand compared to recycled water available	Availability exceeds demand	Availability exceeds demand by 1,534 AF in 2017

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Queensland Urban Utilities**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Provision of water & sewerage services and provision of recycled water, 28 Wastewater Plants and 116 Water Reservoirs		
Service Area (square miles): 5,554 square miles		Average Annual Daily Flow or Demand (MGD): Wastewater 101 MGD
Population Served: 1.5 million residents		
Location		
Street Address: 2/15 Green Square Cl, Fortitude Valley		
City: Brisbane State: QLD		Country: Australia
Zip Code/Country Code: 4006		
Utility Representative Contact Information		
Name: Colin Chapman	Phone: 0419 657 170	Email: Colin.Chapman@urbanutilities.com.au

Organizational Culture

Our purpose is to “enrich quality of life”, supported by our vision: “To be recognised for our excellence in water and sewerage services that meet the evolving needs of our customers and communities.”

This purpose and vision is supported by our Utility of the Future – Future Directions, link to Corporate publications for additional information provided here: https://www.urbanutilities.com.au/about-us/corporate-information/publications.

We will continue to improve our information, strategies and investment decisions to help us better understand and meet the evolving needs of our customers and communities. If we can get this right and build on it, there are no boundaries to what a Utility of the Future can achieve.

Queensland Urban Utilities sees itself as a leader in innovation in the South East Queensland region. The organisation actively seeks to challenge itself, and industry thinking, to come up with lasting solutions to the social, economic, and environmental issues that come with supporting our fast-growing communities.

Not only are we working on ways to optimise our water and wastewater treatment processes, we are also exploring resource recovery, energy neutrality, reduced materials handling and smarter systems and processes – the benefits of which will contribute to a healthier environment and flourishing communities.

Queensland Urban Utilities is committed to innovating for a better future. This commitment is supported by our centre-led locally deployed model for embedding a cultural innovation program across the organisation. Queensland Urban Utilities has also established cutting-edge innovation, research and development facilities, one of which is our Innovation Precinct where we are undertaking ground-breaking research in collaboration with universities, industry partners, other utilities and community groups. The precinct has also enabled Queensland Urban Utilities to extend its engagement and reach within the community by hosting numerous tours each year.

Launched in late 2013, Queensland Urban Utilities' Innovation Program (the Program) is underpinned by the premise that innovation can happen anywhere, and be cultivated by anyone. It is about doing things better, working smarter, and making our lives – and our jobs – easier.

The Program provides a supportive environment for our people to generate ideas, follow them through, and inspire others to be creative and inventive. It also makes it economically feasible to ask 'what-if' questions and generate preliminary answers.

Through the formal program, we enable innovation by giving our employees permission to create, collaborate, adapt and respond to change, and most of all permission to fail safely, and share the lessons learned.

The Program is firmly cemented in the precept that culture is vital to a successful innovation model, in particular:

- leadership,
- an appropriate corporate strategy, and
- a capable and motivated workforce.

The Program

Our multi-faceted Innovation Program is made up of five equally-important elements:

- idea generators,
- innovation catalysts,
- the CEO Innovation Hour,
- mentors, and
- the Innovation Precinct.

Idea generators. We recognise that great ideas come from anyone, anywhere in the business, which is why we encourage staff to embrace innovation and submit their ideas for consideration, regardless of their complexity. These passionate and creative employees are known as 'Idea Generators' and are the crux of our Innovation Program. To date, 225 staff have assumed this title.

***Innovation catalysts*.** Our iQ Group comprises 'Innovation Catalysts' from across the business who are responsible for encouraging staff to become 'Idea Generators'; sharing and promoting ideas with relevant areas of the business; and tracking and monitoring the innovation process from inception through to delivery. Innovation catalysts undergo intensive training, which gives them the skills to foster innovation and creative thinking within the organisation.

CEO Innovation Hour. Every quarter, we host a CEO Innovation Hour, a forum where employees are given the freedom and support to pitch their ideas directly to our CEO. If approved for development, the Idea Generator is assigned a Mentor from a relevant area of the business.

***Mentors*.** The role of a Mentor – chosen from a pool of 37 senior managers and executives – is to provide their assigned Idea Generator with support, leadership and resources (time, budget and staff) to ensure an idea is progressed to completion without obstruction.

***Innovation Precinct*.** The Innovation Precinct, at Luggage Point Sewage Treatment Plant, is the first of its kind in Australia and is integral in supporting and developing an innovative, collaborative culture.

The Precinct houses:

- scientific research projects with leading university research organisations, collaborate with over 30 utilities and technology providers.
- pilots and trials with industry partners to bridge operational capacity and capability gaps, and
- innovations targeting optimisation of operational processes and efficiencies, which reduce cost and increase business development opportunities.

The Precinct enables our employees and partnering organisations to look for smarter, more efficient ways to operate. The dedicated facility brings together employees with an alternative set of ideas and problem-solving approaches and easily generates an innovative, collaborative environment. Ultimately, the facility is an established cultural symbol for the generation of innovative solutions, and brings our award-winning Innovation Program to life.

The Framework of IDEAS

To ensure new ideas are given ample opportunity to flourish, Queensland Urban Utilities has a formal process for capturing, vetting and resourcing projects to see them through to completion. Aptly, this five-stage process translates to the acronym: **IDEAS** – **I**dea generation and capture, **D**etermine strategic alignment, **E**valuate, assess and analyse, **A**ction and implement, and **S**olution monitored.

Fuelling the innovation fire

Driving the delivery of our Innovation Precinct is our Innovation and Research and Development (IRD) team, which encompasses five staff members who are responsible for the program's ongoing governance and management.

The team includes the Innovation, Research and Development Manager; Research and Development Business Partner; Post-Doctoral Research Specialist Algae; Innovation and Research Program Officer; and Research and Development Technical Officer.

The Research and Development Technical Officer, was recently created to continuously enhance the technical skills of our employees. This role – known colloquially as the 'Operator of the Future' – gives operators the opportunity to spend 6-12 month placements embedded in the research centre projects.

The objective is to challenge the standards of organisational practice by engaging these operators in emerging technologies. They work alongside scientists, industry partners and engineers, enabling open communication, and knowledge and information sharing across the strategic, tactical and operational levels of the business.

Our Innovation Program is funded from our overarching Research and Development (R&D) budget, which also allocates funds for collaborative research and pilots and trials. In recent years, we increased the Program's budget by 335%, which highlights the importance Queensland Urban Utilities is placing on embedding innovation into our organisation's culture, and implementing change that adds value. Innovations can also funded from decentralised group budgets. These investments are generally offset by the operational efficiencies realised following implementation of an idea.

To help build our constructive and creative culture, we also provide recognition and rewards for our innovative employees in the form of monetary gift cards, training and development opportunities, and public acknowledgment through our internal colleague recognition program, external media coverage, inspirational internal storytelling, and an annual award program. These initiatives encourage others to follow suit and become Idea Generators.

Refer to the link provided for additional information on the culture of innovation, Innovation: Harnessing the Power of Creative Minds': www.awa.asn.au/documents/129_OzWater17_Technical_Paper.pdf

Taking innovation to the world stage

Our award-winning Innovation Program continues to evolve and gain recognition both nationally and internationally.

In 2015, we were invited to join 39 water utilities from around the world as a participant in the Water Research Foundation (WRF) Project – Fostering Innovation within Water Utilities. As a result of our participation QUU was chosen a case study for a formal cultural program. Refer to the link provided for the full report: http://www.waterrf.org/Pages/Projects.aspx?PID=4642

As a result of this participation, we have developed mutually beneficial relationships with a number of international water utilities and industry representatives.

Our Program continues to generate significant interest world-wide, demonstrating that our approach to innovation is transferring across the water industry.

Organisational Culture

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Innovation Program Commitment	Engaged Board & Executive Committed IRD Budget Engaged IRD Program	• Provided 2x six monthly updates • Strategic R&D measure on track • 30 stakeholders interviewed R&D Road map 2018-23 developed
People Engagement	Employee effectiveness >70 Targeted a 10% lift in direct innovation engagement with staff from 20% (275) to 30% (330) Increase employee awareness and participation in regard to undertaking innovative and research practices 2017 Annual Reward and Recognition	• 71% "feel encouraged to have new ideas and better ways of working" • 31% of employees are directly engaged in the innovation program • To date 78 trained innovation catalysts/ accelerators • To date 68 staff trained Customer Based Design • 45 reward recipients
Idea Generation	New ideas generated by employees Innovations approved by the CEO CEO Enrich roadshow/VR experience	• 342 to date • 134 to date • 54 additional ideas

Partnering and Engagement

The Innovation Precinct enables our employees and partnering organisations to look for smarter, more efficient ways to operate. The dedicated facility brings together employees with an alternative set of ideas and problem-solving approaches and easily generates an innovative, collaborative environment. Arguably the heart of the precinct is the partnering research centre. This heritage-listed building has gone from generating power in the 1920s to generating ideas for the 21st century.

The Innovation Precinct supports:

- University and Industry partner research
- Showcasing past, present and future innovations and technology trials
- Education and Graduate Pathways Program
- Community partnerships and engagements

Refer to the link provided for additional information on the Queensland Urban Utilities Innovation Precinct, 'Transforming this generation's complex waste problems to next generation's sustainable solutions': http://aomevents.com/media/files/IPWC%202017/papers/chapman-colin_-dwyer-jason.pdf

m. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

University and Industry Partner Research

Queensland Urban Utilities has established a close partnership with the University of Queensland's Advanced Water Management Centre. The Precinct provides the university partner with unparalleled access to cutting-edge facilities, while granting us direct access to cutting-edge research for rapid uptake of technology. Currently, nine researchers – including an Advanced Queensland Fellowship holder – are actively working at the Precinct across eight collaborative projects.

At the heart of the precinct is the Tank Farm process water supply system. There is no other dedicated wastewater facility in Australia that provides potential research partners access to large varieties and flows of process water all available at one location. The centralised water supply encourages efficiency in investigations, and permits for multiple activities to be delivered in partnership with various industry bodies and research organisations. It also gives us the opportunity to participate in and leverage off projects. The Innovation Precinct has dedicated floor space which houses both world-first projects (like the 1.2 km sewer pilot plant) and Australian-first projects (development of an Anammox farm).

Queensland Urban Utilities also hosts industrial projects at the Precinct, with a number of industry-lead projects under investigation, such as, Paques Anammox, Veolia ANITA Mox, Microvi, Scalene, etc.

As a result of these relationships, Queensland Urban Utilities can engage directly with industrial professionals and technicians and up-skill our staff to operate these futuristic technologies. We can also directly assess the benefits of the technology efficiently and at low cost.

The facility also provides our employees with a next-generation, innovative space to work, and an opportunity for our operators and engineers to work side by side with scientists

Showcasing past, present & future innovations and technology trials

The Innovation Precinct is an established cultural symbol for the generation of partnerships and is a catalyst for innovative solutions, which will enhance how we deliver services to customers, lower our costs, and reduce our carbon footprint.

Designated showcase areas and an Education room have been designed to facilitate educational programs and to allow exposure to live sewage experiments in a safe environment. The Innovation Precinct has a rally area where students and visitors can view the experiments and projects, whilst also providing some interactive activities and displays that help to bring our award-winning Innovation Program to life.

Underpinning this approach is a plethora of artefacts placed across the precinct and its grounds representing our past, present and future innovations. Three themes have been intertwined within the key elements to enable a multitude of tours agenda to be crafted to satisfy any tour party and its appetite. The three themes include historical stories and displays celebrating our past innovations, urban water story boards and display highlighting the vital role Water Utilities play within the urban water cycle and pilots and displays highlighting how Queensland Urban Utilities is enriching the quality of life as an environmental leader in the development and application of future green infrastructure solutions.

Education and Graduate Pathways Program

Queensland Urban Utilities sees great potential in the education of tomorrow's generation, as it is they who will become our regulators, rate payers and workforce.
The Innovation Precinct provides an unparalleled opportunity for tertiary students to work on an industrial site in real-world conditions, preparing them for future work in the water industry. Our pathways programs have been underpinned by three key steps:

1. **Engagement** - Engagement activities are typically the first time a student has come in contact with the utility and provides a great opportunity to enable a deeper understanding of the roles and the requirements for our employees to deliver high quality products and services.
2. **Inspiration** - Students may then be inspired to pursue vocational placements within our organisation which provides them with deeper insights into a career within the water industry.
3. **Aspiration** - Students may then wish to undertake longer terms placements in which they are provided projects to deliver outcomes commensurate with their skill level and aspirations.

Our Education Program includes undergraduate and graduate placements. In 2017, we engaged nine engineering placements, including vocational and six-month Masters Placements. Each student was provided a specific project and mentor. These students undertook projects which provide significant insights for the student and Queensland Urban Utilities, and could not have occurred without successful mentoring from within the organisation.

We also offer an undergraduate program that places students into the Innovation, Research and Development Program across the organisation. The program evaluates future processes as part of our graduate program and provides opportunities to engage future engineers as well as skilled post-doctorate researchers in the development of tomorrow's treatment processes.

Community Partnerships and Engagements

Our most recent historical display, *The Looseum,* is a mini-museum set up at the Innovation Centre, which features three thunderboxes (outdoor toilets) rescued around Southeast Queensland and restored. We partnered with a community group, Men's Shed, to restore the dunnies. The Looseum is toured regularly by school groups, research partners, and international visitors. QUU will be holding a free special VIP tour in June 2018 and the response was overwhelming with over 200 expressions of interest from the community.

n. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

Research and Development Strategic Commitment
Our Innovation Program is funded from our overarching Research and Development (R&D) budget, which also allocates funds for collaborative research and pilots and trials. In 2014/15, we increased our Innovation Program's budget by a staggering 335% on the previous year, which highlights the importance QUU is placing on embedding innovation into our organisation.

Fuelling the innovation fire
Driving the delivery of our Innovation Precinct is our Innovation and Research and Development (IRD) team, (refer to part 2, "Fuelling the innovation fire", for additional information).
Collectively, the team:

- Identifies internal and external opportunities to promote Queensland Urban Utilities as an exemplar in the field, such as 'lunch and learn' sessions, workshops and trade shows.

- Cultivates local and international partnerships to deliver significant leverage on invested dollars. At present, we host $10m worth of collaborative research projects at our Innovation Precinct, which involve 30 partner organisations and universities across 16 different projects.
- Drives growth in partnering opportunities outside of the Precinct. At present, we have 63 industry research projects and technology trials in progress across our networks and sewage treatment plants.
- Engages school and university students in guided tours of the Precinct to educate them about the role Queensland Urban Utilities plays in the urban water cycle and how we are shaping the future through

innovation, research and development. We are now hosting regular Precinct tours, which consistently result in positive feedback.

In addition to the IRD team, the delivery and success of our vast program would not be possible without our key research partners and our internal innovation champions, mentors and our people.

o. **Did you partner with other stakeholders or organizations as a part of your implementation process?**

The Partnering Pathways Framework

In early 2017 based on the precinct combined initiatives an Innovation Precinct Framework was developed in order to create value beyond our own capability and capacity. We acknowledge that, in order to shape our own environment and deliver novel and new technologies, we need to partner with those who can assist in bridging the capacity gaps. As such, a Partnering Pathways Program has been implemented highlighting the importance of partnering with Universities, Industry and other utilities.

Of course, it's no use generating these novel new technologies if our employees don't have the necessary capability to operate and deliver the expected benefits, which is why we have also established a Training and Education Pathways Program to support the delivery which partners with the Department of Education and schools across our community. See response to Question 2a, Education and Graduate Pathways Program for additional information.

p. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

We understand the vital role our business plays in fostering healthy and flourishing communities, which is why we are committed to providing sustainable, affordable and reliable water and sewerage services now and into the future. Intent on elevating our performance to the next level, we recognised the importance of cultivating an innovative workplace culture, hence the launch of our dedicated Innovation, Research and Development Program in 2013.

To expand the program, it was vital that we had access to premises that could house and support external research partners and allow for collaboration opportunities. To facilitate these requirements, we established our research centre, which is housed within the Innovation Precinct (the Precinct).

To embark on such a venture like the Innovation precinct we needed to create a shared value amongst all the parties both internal and external to enable the support and delivery.

There is no other dedicated wastewater facility in Australia that provides access to such large volumes and varieties of process waters to support both global and Australian-first research.

Most importantly a strong strategic alignment to the organisation, shared vision of the future and a clear understanding of the expected applied benefits for our customer and communities.

q. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

Our digital transformation journey isn't just about streamlining the operational side of our business; it's about enhancing the customer experience and making it as easy as possible for customers to deal with us using their preferred communication channels.

Driving a 'digital innovation culture' is a core component of our digital strategy, and a great example of this was hosting WaterHack.

In February 2018, Queensland Urban Utilities became the first company in Australia to host a water hackathon, which we aptly called WaterHack18. Over 100 of Brisbane's bright minds (think developers, designers, engineers, scientists and marketers) gathered to hash out potential solutions to specific topics including sustainability, Smart Cities/Internet of Things and Blockchain technology. These hackers were mentored by industry experts, including 20 of our own QUU specialists. Refer to link for additional information: https://www.waterhack.com.au/

But as we know, customer expectations are ever evolving. In the digital age, customers want round-the-clock service, which is why we've been developing a chat bot as an initial pilot into the artificial intelligence and bot space. We plan to launch the trial soon, which will give us a 24/7 customer service presence on social media, which is an exciting leap forward.

r. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

For additional information in relation to QUU's Innovation, Research and Development Projects, click on the link: https://www.urbanutilities.com.au/about%20us/innovation

For additional information in relation to QUU's Precinct, click on the link: https://www.youtube.com/watch?v=jlcGz9cvY6w

For additional information in relation to Future Innovation at Queensland Urban Utilities, click on the link: https://www.youtube.com/watch?v=GwgSard6YKg

Partnering and Engagement

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Collaboration Activity	>80% Increase stakeholder awareness and engagement in regard to Queensland Urban Utilities innovative practices One formal R&D partnership which will include benefits in a report to ELT and the Board Establish discussion for a minimum of 3 MOU opportunities.	• QUU collaborates with over 30 utilities and technology providers. • Signed formal agreement to accelerate technology adoption and exchange internationally. • Signed off three new Collaboration MOU's with key stakeholders
Showcasing Innovation and Technology Trials	Established an innovation engagement measure for stakeholder engagement one additional stakeholder activity per quarter	• On track for 60 tours FY17/18 • Increase of 2.5 engagements per quarter
University and Industry Partner Research	Increase the project partnership engagement within I, R&D program (53) by 10% (+5)	• 60+ industry research & technology projects

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Region of Waterloo, Ontario Canada**		
Type :Multiple plants		
Service Area (square miles): 530	Average Annual Daily Flow or Demand (MGD): 16,000	
Population Served: 535,000		
Location		
Street Address: 150 Frederick St		
City: Kitchener	State: ON	Country: Canada
Zip Code/Country Code: N2G 4J3		
Utility Representative Contact Information		
Name: Nancy Kodousek	Phone: 519-575-4447	Email: nkodousek@regionofwaterloo.ca

Organizational Culture

The Region of Waterloo's organizational culture is shaped by a simple mission statement: "We serve. We engage. We inspire." We aim to serve the community via caring and responsible government. We wish to engage the community by listening and responding to its needs. And we hope to inspire with new ideas and creative solutions. All three of these components serve as guiding principles in how the Water Services division delivers projects to enhance the quality of life of our residents.

It is also important to the Region to establish the highest possible levels of employee satisfaction. As a result, employee surveys are routinely conducted and feedback opportunities are available on an ongoing basis. The results of these surveys show that employees want opportunities for input and collaboration on projects and have respect for strong, clear, communicative leadership, which are all now key considerations in any project plan.

The Region of Waterloo has long strived to be a leader in environmental stewardship with inspiring programs related to waste management, energy conservation, transportation planning and source water protection and conservation. With a rapidly growing community that relies primarily on groundwater sources, the sustainable management of water operations becomes critical.

As an organization, this means placing a high priority on infrastructure renewal, staff training, meeting or exceeding all compliance requirements and researching the most innovative technologies and practices in the water treatment field. The Regional values include service, integrity, respect, innovation and collaboration. Each one of these values is central to any project plan as well. In the case of biosolids planning, service included listening and responding quickly to all inquiries with respect and integrity through open and clear communication and ensuring all opinions were given validity and proper consideration. A key component of evaluating options for our biosolids management future was scoring how innovative the approach was and the approach also needed to be collaborative with a number of groups, including lower tier municipalities, interest groups, sector representatives, neighbourhood associations and the public at large – not to mention the provincial and federal agencies who regulate the field.

As far as innovation is concerned, the Region encourages staff to have conversations about new ideas and share information that may lead to creative new approaches. These conversations may include various levels of staff, other municipalities, stakeholders or even the public at large. It was through many of these conversations that the Region developed the concept of an innovative approach to managing their biosolids.

The Region of Waterloo believes that strong environmental leadership involves finding the most sustainable solutions for the community that addresses all steps of the process from finding water sources, to treating water and on to wastewater and biosolids treatment.

The Region of Waterloo has one of the most unique water supply systems in North America. Water supply in the Region is 80 per cent from groundwater and 20 per cent from surface water. What makes us unique is that we have over 120 groundwater wells to supply our water system and 55 controlled points where drinking water enters the distribution system. Our water supply system is operated 24 hours, seven days per *w*eek.

Our wastewater system is also unique with 13 wastewater treatment plants comprising of distinctly unique treatment technologies. Working with our partners in the watershed, we are implementing an aggressive capital program to upgrade our facilities with state-of-the-art treatment and control technology. We are continuously developing programs to reduce our environmental impact including minimizing our energy demands and improving the handling of biosolids.

We are a recognized leader in the municipal industry for source protection planning and conservation. By increasing awareness of ways to reduce the use of de-icing salt, improve farming practices and the need for spill response plans when handling chemicals, staff are helping ensure our source water is of the highest quality and sustainable. By reducing infrastructure leaks, installing water-efficient appliances, and conserving water outdoors, residents, businesses and staff are helping to extend drinking water supply capacity and save energy.

Staff at the Region is encouraged to receive training and certifications in a variety of water-related programs. Staff is also frequently engaged through focus groups and surveys to ensure that Water Services leadership is aware of any concerns and ideas that staff may have and to keep an open mind to service changes and improvements.

As a corporation, health and safety is also paramount. Staff are fully trained and compliance is regularly audited to prevent workplace incidents and the safest workplace possible. Achieving this includes a wealth of training at all staff levels and heightened education for supervisory and management staff.

In conclusion, the Region of Waterloo is an organization that promotes constant learning, sharing of ideas and robust, informed planning to ensure both the staff and the infrastructure are well-equipped to provide the highest possible level of service. By putting environmental stewardship and sustainability as top priorities, the Region has been able to attract professionals on staff that wish to be part of the process in ensuring the long term health of a growing community.

Beneficial Biosolids Use

In designing a new biosolids management plan, a few key first steps were needed. With public education and participation being paramount, we decided to name it the “Biosolids Strategy” to give it an easy to recognize name that would be consistent in all public material. It was also very necessary to establish both a Steering Committee comprised of technical experts, political representatives and other decision makers as well as a Stakeholder Committee featuring representatives of all key sectors.

A business case was made for finding a beneficial use for biosolids partly based on the lack of control the Region would have in relying on out-of-jurisdiction landfills to accept our biosolids, since landfilling of biosolids is primarily managed by our contractor.

However, the primary focus of our biosolids strategy was placed firmly on public engagement and education. In the early going, public surveys and focus groups were conducted to understand what was important to the community. The results showed that a sustainable solution with a beneficial re-use was very important to residents. Knowing that sustainability was important allowed the Region to invest in a dedicated website, an online engagement platform for project updates, a number of public events and advertising campaigns aimed at creating awareness for the topic of biosolids and explaining why a responsible municipality needs a strong plan.

Since 2003, the Region of Waterloo has also invested heavily in the concept of reducing biosolids volumes through infrastructure and process upgrades. Three brand new de-watering facilities were opened in 2009, 2012 and 2014 to allow the decommissioning of lagoons and reduce the number of trucks needed to haul biosolids.

The steps the Region has taken over the years in biosolids management reflect an ongoing study of alternate uses for biosolids and evaluation of the latest technology being used in other markets. As options become viable due to compatibility with existing infrastructure and the long-term goal of reducing volume, investments are made to enhance the processes.

In terms of managing risk, the contracts with external partners are constructed to protect the Region in the short-to-medium term and allow flexibility for changes in regulations or crisis situations. Through this planning, the Region is able to maintain necessary levels of staffing and contractor support to ensure no disruption to the process.

Biosolids operations in Ontario share a common and multi-faceted problem: How to continue operating in the winter when land application programs are not available. Capital projects for municipalities to manage biosolids year-round are costly and energy intensive. Incinerating biosolids destroys their nutrient value, and withholds an economical source of nutrients from the agricultural community. Implementing new storage facilities
in Ontario is problematic for numerous reasons, one of which is the requirement that storage facilities be a significant distance from population centres, as rural neighbours are not willing hosts.

In the last two years, the Region's biosolids contractor, Terratec Environmental Ltd., has been able to gradually increase the beneficial use of biosolids through land application and mine reclamation at the Vale site in Sudbury, Ontario. This has contributed to a significant reduction in atmospheric emissions caused by biosolids operations. Our carbon footprint due to biosolids decreased from approximately 30,000 ton of CO_2-eq/year in 2012 to about 8,000 ton of CO_2-eq/year in 2017. In 2015 of the 30,000 wet tonnes of biosolids produced in the Region, 14,000 wet tonnes ended-up in landfills, 11,000 wet tonnes were land applied, and the remainder was used for mine reclamation purposes. The percentage of biosolids beneficially used increased to 95% in 2016, with about 45% going to agriculture and 50% going to mine reclamation sites. The amount of biosolids that were beneficially used decreased to about 70% in 2017 due to weather related and operational issues at the mine site.

During the land application prohibition period in Ontario, from December 1 to March 31,
biosolids can now be used effectively to address one of the province's most significant environmental concerns: reclamation of lands impacted by mining.

Reclamation of impacted lands, as an off-season biosolids management alternative, provides:

- a dependable, cost-efficient biosolids outlet for the Region of Waterloo;
- the preservation of the entire nutrient value of biosolids; and
- an effective and cost-efficient tailing cover system for the mining community.

The biosolids application on Vale's Copper Cliff Central Tailings Area has been so successful, the mining industry is now identifying its use as a key strategy in mine closure scenarios on mine tailings, and on other mine-impacted properties.

The utilization of biosolids also greatly offsets conventional reclamation costs. Conventional reclamation requires the use of expensive materials that are mined or quarried from neighbouring lands. This solves one problem at the expense of creating another. Considerable resources need to be spent to extract virgin soil and transport it to the mine site, and additional resources are needed to then revegetate the virgin soil.

Any risk factors or negative impacts to water are also closely monitored. Surface water samples have been collected at two locations downstream of the site as previously identified and approved by the Ministry of the Environment and Climate Change (MOECC). Groundwater was also sampled at existing wells that are within the known groundwater flow path and downstream of the biosolids application area. No increases to parameters of concern were detected and all are typical to tailings-impacted water. These findings are also consistent at the other reclamation sites.

The project at the Vale mine has successfully managed to divert over approximately 26,000 metric tonnes of the Region of Waterloo material from landfill in the last three years. In 2016 and 2017, vegetation in the tailings was harvested and used by Vale for dust control. In 2017, Terratec harvested approximately 40 acres (16 ha) of forage, creating 283 bales, which equates to just over 7 tonnes/hectare or 3.2 tons/acre. The average hay yield (tonnes/acres) for Ontario according to OMAFRA statistics is 2.5; northern Ontario is 2.25 and Sudbury area is 2.15 (average of 2015 and 2016 data). This is on an area that was essentially brown three years prior to harvest.

It is planned that more vegetation will be harvested each year and be used to offset the importation of hay or straw from farming areas outside of Greater Sudbury where it is currently sourced. This will reduce fuel consumption for transporting this material and will increase straw and hay availability to the agricultural community in Northern Ontario.

Complaints regarding odours or other aspects of the operation are taken very seriously, but have been very rare since the reclamation operation began. The reclamation project requires constant cooperation with a number of agencies to ensure the practice was not negatively impacting anyone and complaints would be properly addressed.

The bottom line is that the project with Terratec and Vale has created a new use for biosolids in Ontario and has provided an updated and beneficial path to reducing waste through inefficient or out-dated biosolids practices.

The contract with Terratec has allowed the Region of Waterloo to follow its own strategic objectives of collaboration and innovation and to continue to act as a leader in environmental stewardship. Communities often face difficult

challenges and the never-ending creation of biosolids is among those challenges. Such challenges call for unique and sustainable solutions and the Region of Waterloo will continue to push for these solutions in all of its operations.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Beneficial use	Increase percentage of biosolids going to agricultural land and mine tailing pond reclamation and minimize biosolids going to landfill	We have doubled the amount of dewatered biosolids going to land application, increased the amount going to tailing pond reclamation by 100% and reduced biosolids going to landfills by 60% in the last three years.
Carbon footprint	Reduce carbon footprint	Carbon footprint due to biosolids operations was reduced by approximately 75% between 2012 and 2017.
Chemical use	Reduce polymer use by 30%	We have an on-going polymer optimization study to reduce polymer use at our three dewatering facilities

Utility Description (combine all plants if a multi-site system)		
Name: **Renewable Water Resources (ReWa)** Type (e.g., single plant, regional system, multiple plants, collection system only, stormwater, etc.): Regional system		
Service Area (square miles): 845	Average annual daily flow (MGD): 37.25 MGD	
Population Served: 495,777		
Location		
Street Address: 561 Mauldin Road		
City: Greenville State: SC	Zip Code: 29607	
Contact Information		
Name: Ashley Rhinehart	Phone: 864-299-4000	Email: ashleyr@re-wa.org

Organizational Culture

Through the passion of our workforce, ReWa has been a community partner and an industry leader safeguarding our water environment for future generations since 1925. We serve nearly 500,000 industrial, commercial and residential customers in Greenville County and parts of Anderson, Spartanburg, Pickens and Laurens counties, all located in the northwest corner of South Carolina known as the Upstate.

As part of this continuing effort to promote a cleaner Upstate, we sometimes find it appropriate to look inward. We spent a good part of the past year thinking about how to make our goals more in line with what we do every day. That led to ReWa creating a new mission statement:

“Enhancing our community’s quality of life by transforming wastewater into renewable resources through responsible and innovative solutions.”

Our new vision statement is: “Through the passion of our workforce, ReWa will be a community partner and an industry leader safeguarding our water environment for future generations.”
We also defined our core values for the future: Professionalism, Unity, Integrity and Trust, Safety, Accountability, and Dedication. Throughout our offices and facilities, you can see the Mission, Vision, and Core Values displayed on signage, computer log in screens, employee t-shirts and much more. This is a reminder to our employees of the importance of embodying the values that make ReWa and the Upstate a great place to live and work.

We seek to promote a cleaner environment through our treatment process, which means that in addition to treating wastewater and replenishing our Upstate rivers and streams, we are continuously seeking new ways to recycle our by-products and educate the community about how they can help us protect our environment for future generations.

Furthermore, the clean water can be used for irrigation of recreational areas such as golf courses, and ultimately conserves our drinking water. ReWa uses clean water to irrigate the lawn at its administration building as well as for multiple uses at our WRRFs. ReWa recently completed a Native Garden and Reclaimed Water Educational Campus at the Mauldin Road Facility to serve as a tool for education, community partnerships, and engagement.

Also, ReWa utilizes a Combined Heating and Power unit that makes use of our methane gas, a renewable by-product of the wastewater treatment process, to create an efficient source of energy and reduce costs.

ReWa has implemented several solar fields in the last year that are reducing our energy consumption.
Our recycling initiatives are key to safeguarding the environment. Our biosolids program allows farmers to utilize a safe, organic by-product of the wastewater treatment process as an agricultural fertilizer. ReWa innovatively utilizes its renewable by-products on a daily basis to reduce energy consumption and demonstrate environmental stewardship.

We feel it is important for public utilities to evaluate how they can become more effective, especially when facing certain challenges, like aging infrastructure and increasingly stringent regulatory requirements. Recognizing this need, we adopted the Effective Utility Management (EUM) strategies as developed by the U.S. Environmental Protection Agency (EPA) in conjunction with six national water and wastewater associations. We are implementing these strategies throughout all organizational levels.
Partnerships with local utilities, schools, and organizations are a vital part of creating a connected community and providing educational and career opportunities for people of all ages.

Over the past seven years, we have developed and implemented several public education campaigns to support our goal of promoting a cleaner environment and protecting the public health and water quality of the Upstate Rivers, lakes and streams. These campaigns are designed to inform and educate, resulting in community-wide efforts that collectively make a difference. ReWa values environmental education and continually create new and exciting ways to engage our local community. To learn how you can protect the environment and implement our public education campaigns visit: www.befreshwaterfriendly.org or www.ariverremedy.org.

Partnering and Engagement

Innovation and forward thinking have long been hallmarks of Renewable Water Resources (ReWa), but the past 18 months have seen the agency embark on it most ambitious projects to date: Dig Greenville, a $46 million wastewater conveyance project being approximately 100 feet below a bustling downtown that is aimed at providing sewer service for the rest of the county for the next century. But Dig Greenville is more than a ReWa project. This extensive project requires collaborating with numerous other entities and agencies including community members, neighborhood associations, city and local government, the zoo, and other utilities. This required numerous opportunities for us to create new ways to engage and interact with our stakeholders and partners to share information. Some of the ways we

proactively create this message was through community meetings, a project website, social media, monthly e-blasts, media releases and more.

a. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

ReWa created a strategy to engage stakeholder groups – our Public Engagement Plan.

The goal of the Public Engagement Plan is to proactively engage project stakeholders and community leader leading up to and continuing through the construction phase of this project, and to do this, this plan will employ a "Talk About It", "Hear About It", "Read About It" and "Celebrate it" strategy. This outreach will engage the community interactively to keep them informed using multiple social media and innovative engagement strategies. This plan will also keep the stakeholders actively engaged in the project by allowing them to utilize interactive time lapse photography, and live action project cameras.

"Talk About It"

- Through all phases of the project, ReWa will initiate, organize and conduct meetings and forums with Project Stakeholder organizations and groups to provide project specific information and solicit public interaction.
- ReWa create and managed a toll-free Project Hotline that will be dedicated to track, prioritize, and direct inquiries. This will allow easy access for stakeholders to receive information, address concerns and questions in a timely manner and as they occur. The hotline will have the ability to automatically export the voice mail message into an email or wave file so it can be forwarded to the appropriate person(s) and addressed in a timely manner. This will allow the call to be tracked through resolution of the issue as well. Automated options will be available through a menu so project staff can appropriately respond to the caller's questions.

"Hear About It"

- ReWa developed and distributed media releases to local media outlets communicating construction milestones, announcements of community forums, groundbreaking and completion ceremonies, major traffic shifts and lane closures, inclement weather road conditions, and address any questions or concerns relating to the project.

"**Read About It"**

- ReWa developed and maintain a project website which will provide public access to all traffic alerts, meeting notices, a construction photo journal, FAQ page, hotline information, and social media links, and provide a place for members of the public to request information on project/website updates. All comments and suggestions will be read, catalogued, and distributed to the project manager and all team project managers. All comments will be acknowledged and all questions responded to as quickly as possible.

"Celebrate It"

ReWa is committed to producing an exceptional project focused on quality, safety and innovation which is worthy of national recognition and awards within the sanitation design and construction industry.

b. Did you partner with other stakeholders or organizations as a part of your implementation process?

Early in the planning process, we created a list of Project Partners: The City of Greenville, Greenville Zoo, Greenville Zoo Foundation, AJ Whittenberg Elementary School of Engineering, Black & Veach and Complete Public Relations, as well as many contractors that specialize in tunneling. Each was involved in numerous ways of communicating the project's goals.

c. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

Our biggest obstacle was the unique timeline of this project. We announced it in November 2016 during the preliminary planning phase, however, the physical construction was scheduled to begin in Spring of 2018. The next step in the timeline is the tunnel boring that is scheduled to begin in early 2019. Creative engagement has been a part of our strategy to ensure that this unique timeline did not prohibit positive and continuous engagement with the local community throughout the duration of the project.

Additionally, a venture of this magnitude and nature is new to the Upstate area and we were intentional with providing various outlets and resources to learn about the project and why it was necessary.
As a part of our plan to overcome this obstacle, we created a media plan to keep the story relevant and in the news during the waiting period. Below is a schedule of that work we followed in 2017:

- January -- AJ Whittenberg /Lego tunnel story announcement and art for tunnel shaft sites
- February -- Podcast interview on 864 Living
- March – OpEd piece in the Greenville Journal
- April – Cover story in Greenville Business Magazine
- May – Travelers Rest Tribune story: Why a project in downtown Greenville means so much for Greenville
- June: Upstate Business Journal piece on update on the engineering of the project
- July: Thought leader piece in GSA Business Journal
- August: Entercom Public Affairs Shows (six channels on Saturday mornings)
- September: Announce Name the Drill Contest
- October: Announce sponsorship of the Ice on Main to promote DIG Greenville, Greenville Children's Hospital Radiothon Partnership
- November: Name the Drill contest
- December: Rhonda Rawlings Radio show
- January 2018: Story in GVL: Today
- March 2018: Story in Greenville News
- May 2018: Announce the start of blasting

d. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

ReWa utilized many forms of technology to communicate with our various audiences. We used tools such as social media, e-blasts, door hangers, a 24-7 hotline, and the new website.

e. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

More information on the project can be found here: www.diggreenville.org. Additionally, other utilities could reach out to the Public Relations department for tips and tricks, lessons learned and opportunities as well.

f. Performance Measures & Results: Using the table below, please describe the measures that you use to gauge performance in this Activity Area, including the targets that you set for each measure and your actual outcomes to date.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
E-blast subscribers	By the end of 2017, we hoped to have reached surrounding residents with our e-blast communications	By the end of 2017, we have successfully built a good communication tool with our e-blast list and inform the community of Dig happenings
Website	By winter 2018, we wanted an interactive website	Website was created by March 2018

Community Meetings	Goal is to host quarterly meetings	Quarterly meetings are held with moderator and regular attendees
Community Resource Document	To provide a one page document for all resources that the community would need at a glance	Developed a one page document that has all information related to the project and has contact info, etc.
Pre-construction surveys	To complete a pre-construction survey for all interested parties in the vicinity of the project sites	Completed 32 surveys for homeowners in the shaft site area
Conversations with interested parties	Sippin' with Steve (Steve O'Connell, Project Manager) sessions to have the community meet with the project manager and ask questions and learn more about the project	Sippin' with Steve monthly at local coffee shops, signage to promote as well as e-blast reminders and social media events

Utility Description (combine all plants if a multi-site system)	
Utility Name: **Spokane County Environmental Services Department (SCES)**	
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): multiple water resource recovery facilities, sewer collection system, regional wastewater system, regional solid waste system, rural water supply utility.	
Service Area (square miles): 1,781 sq. mi. (entire county), approx. 60 sq. mi. sewer service area	Average Annual Daily Flow or Demand (MGD): 9.1 MGD
Population Served: 123,000	

Location	
Street Address: 1026 W Broadway Ave	
City: Spokane State: WA	Country: USA
Zip Code/Country Code: 99260	

Utility Representative Contact Information		
Name: Toni Taylor	Phone: 509.477.7577	Email: TNTAYLOR@spokanecounty.org

Organizational Culture

The Spokane County Environmental Services (SCES) Department provides an array of environmental protection services for residents of Spokane County, including water resource recovery, sewer collections system operations and maintenance, water resources monitoring and protection, solid waste management and rural water management. The

County sewer collection system currently covers approximately 60 square miles and conveys and treats 9.1 million gallons of wastewater per day for 123,000 residents.

In 2017, the Department was rebranded from the Utilities Division to Spokane County Environmental Services (SCES) to more accurately represent the mission of environmental protection through proactive management of the regional environment. Employees recognize that their roles – whether behind a desk or out in the field – contribute directly to a cleaner Spokane County on land, in groundwater and in our lakes, rivers and streams. Additionally, water quantity concerns in the Spokane River watershed are addressed with forward-thinking strategies and preparation to ensure a balance between streamflow needs and resident needs. SCES is eager to educate residents about its facilities and operations, as well as the benefits of natural resources management that impacts their lives. Ultimately, we work to protect regional water quality and quantity for today and the future.

Spokane County Regional Water Reclamation Facility
In response to declining ground water quality, Spokane County facilitated a multi-decade process of connecting over 30,000 septic tanks to central sewers, culminating in the construction of the brownfield Spokane County Regional Water Reclamation Facility. The County chose to deliver the Facility through a Design, Build, Operate partnership with Jacobs to engage a broad network of Operations and Maintenance expertise with a strong focus on compliance and safety. The addition, first on-line in 2011, increased the total County treatment capacity from 10 MGD to 18 MGD. This new facility uses state-of-the-art membrane bioreactor technology and is designed to meet or exceed current legal requirements for phosphorus removal. The Facility treats to very high standards, which helps improve water quality in the Spokane River and Spokane Valley-Rathdrum Prairie Aquifer. Currently, the Water Reclamation Facility uses nearly 100 percent of its Class A reclaimed water for Spokane River streamflow augmentation, and the remaining amount is used for process water and irrigation of the facility site.

Water Resource Center
In 2011, alongside its new membrane bioreactor water reclamation facility, the County opened a Water Resource Center (WRC) to educate the public on regional groundwater and surface water in both natural and engineered water cycles. A strong effort has been made in the past four years to increase outreach, and today, the WRC serves as a regional education center, conference space and training facility. It includes interpretive displays about regional water resources, with an emphasis on water reclamation and reuse at the Spokane County Regional Water Reclamation Facility (SCRWRF).

Solid Waste Landfill Closure Department
The Solid Waste Landfill Closure section works to protect air and water quality through a groundwater pump and treat facility, several monitoring well networks, leachate collection and treatment, and robust residential well monitoring programs to protect homeowners down gradient of closed landfill sites. The programs are compliant with both state and federal regulations in a cost-effective manner. Successes include:

- Shutdown test of the groundwater treatment facility.
- Reduction of sampling frequencies at one of the sites due to reduced pollution levels.
-

Because of these efforts, residential drinking water and recreational waters in the Little Spokane River are well protected. The department is a diverse team and has female leadership in multiple sections including head of the Spokane County Regional Solid Waste System. Solid Waste employees dedicate a significant amount of time and money to public outreach and education, similar to the Water Resource Center. In fact, both the Solid Waste and Water Resources sections formed the ECO Team to work jointly on environmental outreach efforts. The department is also passionate about developing food waste strategies and implementing composting education.

Employee Development
Spokane County Environmental Services provides employees with countless employee development opportunities:

- Thought leaders present their work and lessons learned at regional events.
- Four employees participated in an external program called Leadership Spokane – an intensive, 10-month commitment to personal growth, professional development and community service. Participants gain an understanding of the roles and responsibilities of a citizen-leader and explore the tenets of servant leadership.

SCES leadership encourages employees to take this course and allows for money in the budget to pay for the cost of the program.

We're not afraid to celebrate either. Each year, we host a Team Day to bring together the different sections of SCES to share accomplishments and a meal. Additionally, SCES leadership supplements an annual holiday party to bring the individual price down so that more people can attend.

People sometimes refer to the County government as "folksy" or "less formal" in contrast to an impersonal type of service. Yet, we're effective and enjoy a fair and benevolent leadership hierarchy. Here at Spokane County Environmental Services, there is a sense of pride that our jobs make a positive impact on the environment, which brings an extra level of commitment to the work we do for our customers and residents.

Partnering and Engagement
Spokane County Environmental Services Department is very active in engaging the community through activities like the following:

Peer-to-Peer Partnering
Spokane County Environmental Services recognizes the importance of peer-to-peer partnerships and believes that sharing information and determining solutions together allows all participants to improve and succeed.

Spokane River Regional Toxics Task Force – This group includes governmental agencies, private industries and environmental organizations. The goal is to develop and implement a comprehensive plan to bring the Spokane River into compliance with polychlorinated biphenyls (PCBs) water quality standards.

Reclaimed Water Committee – Spokane County has participated in a state-sponsored Reclaimed Water Technical Advisory Committee for over 15 years, culminating in the finalization of a new state administrative code in 2018 to formalize water reuse. Spokane County, along with other wastewater utilities, provided technical review and funding to the state to finalize the important rule.

Coalition for Clean Water – Spokane County joins 11 municipalities and special purpose districts in Washington as an active member in the Coalition, representing the largest wastewater and stormwater utilities in the state. Coalition members fund the operating budget of approximately $100K per year, including a full-time executive director. It was formed by an Interlocal agreement in 1985 to address issues of preservation and improvement of water quality, as well as the reduction of pollution and the planning and financing of necessary facilities.

Spokane River Forum – As a contributor to the Spokane River Forum, SCES creates materials, events and activities that promote regional dialogues for sustaining a healthy river system while meeting the needs of a growing population.

City of Spokane – Spokane County works closely with the City of Spokane to manage regional sewer collection and water resource recovery facilities for a combined population in of approximately 300,000 people. The two local governments partner on technical requirements such as industrial pretreatment and treatment capacity analysis along with public outreach activities to educate the community on topics such as water conservation and stormwater pollution prevention.

Membrane User Group – Spokane County and its contractor, Jacobs, have participated in a five-year working group with Suez (formerly G.E.) to seek resolution to membrane capacity limitations during certain times of the year. This group includes wastewater treatment entities from Michigan, Ontario, Oregon and Washington, and meets by teleconference approximately every four weeks to discuss current operational parameters.

Biosolids Incineration Study – Spokane County is supporting a study led by the City of Spokane to examine the feasibility of biosolid incineration. The two entities treat a combined flow of approximately 40 MGD of wastewater and process solids through anaerobic digestion. Currently, biosolids from both facilities are used as soil amendments. In response to

a variety of constraints, including concerns of residual PCBs, the two partners are studying if incineration is a reasonable disposal mechanism for biosolids, in part as a way to destroy PCBs.

Idaho-Washington Aquifer Collaborative – As a member of the Idaho-Washington Aquifer Collaborative, SCES works with Idaho and Washington water purveyors to maintain and/or enhance water quality and quantity for present and future generations by developing management strategies which benefit the Spokane Valley Rathdrum Prairie Aquifer and the Spokane River region. The Idaho-Washington Aquifer Collaborative helps facilitate regional dialogues and studies that result in recommendations for policy directions and shared stewardship of the Aquifer and the Spokane River.

Spokane County Water Conservancy Board – An employee of SCES sits on the Spokane County Water Conservancy Board. The board enables the processing of water-right transfer and change applications at the local level. There are currently 17 water conservancy boards operating in Washington.

Public Outreach

West Valley Outdoor Learning Center – Each year, Spokane County Water Resources enters into an interlocal agreement with West Valley Outdoor Learning Center. This partnership helps bring approximately 1,000 elementary students to the County Water Resource Center for water education.

Central Valley School District – Each year Spokane County Water Resources enters into an interlocal agreement with Central Valley School District. Water Resources staff provides water education to all fifth graders in CVSD.

Eastern Washington Regional Science and Engineering Fair – Spokane County Water Resources staff provides leadership for this annual multi-county event. The overarching goal of the EWRSEF is to encourage students in their studies of science, technology, engineering and math, and to explore career opportunities in technical fields.

Business After School – Spokane County Water Resources and its water reclamation facility operator, Jacobs, have collaborated to provide workshops in a program called Business After School. Business After School is a series of industry skill workshops providing on-site awareness of Spokane's high-demand industry sectors by highlighting new technology, research, development and innovation.

ECO Team – The ECO Team is a committee within County Environmental Services. Its purpose is to find synergies between sections – particularly Water Resources and Reclamation and Solid Waste – so that the department can better benefit from overlapping public outreach goals.

PCB Education – County staff took the lead in creating a website – www.spokaneriverpcbfree.org – dedicated primarily to education about the work being done to reduce polychlorinated biphenyls (PCBs) from the Spokane River. It also includes ways that businesses and individuals can minimize their impacts.

WaterSense – Spokane County has kept its WaterSense certification and partnership active. See the EPA website at www.epa.gov/watersense.

Commercial Outreach

EnviroCertified – Spokane County Water Resources contributes financially to, and sits on the committee for, a program called EnviroCertified. EnviroCertified is a voluntary program offered to local small businesses. It certifies businesses having practices and policies in place demonstrating proper management and reduction of hazardous waste.

FOG Program – Two years ago, Spokane County implemented a fats, oils and grease (FOG) program in its sewer collection system. The program began with an outreach effort to educate food service establishments about the importance of maintaining their grease interceptors to prevent FOG accumulation in sewer lines. The on-going focus of the program is to meet with food service business owners and their contractors as they pump grease inceptors. This

mandatory, twice annual meeting is an opportunity to check pump records and re-educate owners about how their actions can negatively impact the downstream sewer collection system.

Water Bank (homebuilders and well drilling) – To allow property owners to develop their land while maintaining stewardship of the Spokane River watershed, Spokane County Water Resources has been proactive in establishing a water bank in response to changing Washington State water law and the instream flow rule established for the Little Spokane River.

Sewer Installation Handbook – In 2017, Spokane County created a new Sewer Installation Handbook to detail to private sewer contractors and homeowners the requirements of connecting buildings to the sanitary sewer. This stand-alone document outlines all connection requirements for a building. Spokane County meets with all new sewer contractors as they begin work in the County sewer systems and provides this handbook as a guide for the work. If a home or business owner requests making their own sewer connection, the County schedules a one-on-one site visit to discuss the project. The County will then provide the handbook and walk through the site and note specific details of the connection, prior to the owner starting any earth moving.

Business After Hours – Business After Hours is a monthly networking event sponsored by Spokane's business development organization, Greater Spokane Incorporated (GSI). Spokane County Environmental Services was chosen to host the July 2018 event. The event will highlight the Spokane County Regional Water Reclamation Facility and adjacent Water Resource Center.

Sewer Extensions and Construction – From 2016 to 2018, in partnership with the City of Spokane Valley, Spokane County installed approximately 20,000 feet of truck sewer to eliminate existing on-site wastewater disposal to allow for new a sewer connection in an industrial area of the City. Installation of a sewer in this area was a key development priority for Spokane Valley.

Internal Process Improvement

KPIs – Sections within Spokane County Environmental Services have established Key Performance Indicators (KPIs) to better assess and review their performance from year-to-year. The KPIs measure performance, help reinforce accountability and set expectations for the department. This program was taken from a County-wide review of internal processes, based generally on Ken Miller's *Extreme Government Makeover* (2011).

s. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?

Spokane County Environmental Services works on a regional level for many of its projects. As the level of government between state and city, the County provides mid-level planning to water and solid waste programs. This necessitates peer-to-peer partnering on nearly every project we undertake. The County is willing to work inter-agency and interstate to tackle challenging environmental resource problems.

As part of regional water protection, the County manages a voter-approved property assessment to fund water quality activities. This per-parcel fee provides funding for construction, education, and monitoring to protect groundwater today and into the future.

t. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)

In 2014, Spokane County hired a full time outreach professional to develop programs. An additional six staff contribute significant time to regional coordination activities.

u. Did you partner with other stakeholders or organizations as a part of your implementation process?

The County partners with organizations such as the Cities of Spokane, Spokane Valley, Post Falls, Coeur d'Alene and other jurisdictions including the Liberty Lake Sewer and Water District, local school districts, and the Washington State Department of Ecology. The County leverages partnerships with non-profit organizations such as the Lands Council, Spokane River Forum, and the West Valley Outdoor Learning Center.

v. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

Spokane County has developed public interest in water quality and quantity issues through intensive public outreach efforts. This topic is often hidden from public view, but is important for our community. For example the recently constructed County Regional Water Reclamation Facility represent the largest single investment by the County.

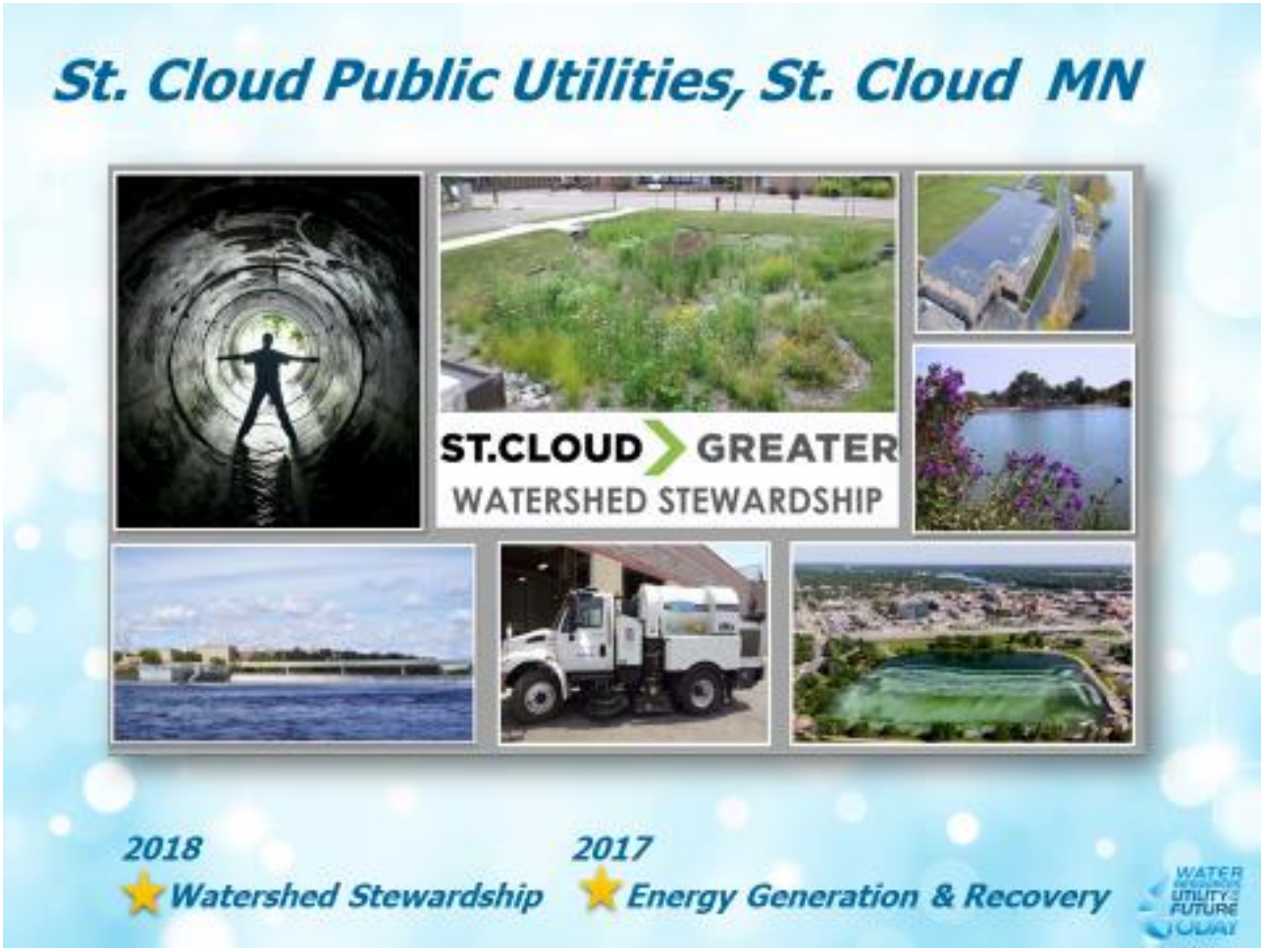
w. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.

Smart technology has been important for our successes in partnering and engagement. Specific examples include redesign of the County website in 2016, interactive computer activities in the County Water Resource Center, and 3-D AutoCAD fly-through touch screen programming provided by Jacobs.

x. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?

We welcome inquiries by calling Toni Taylor at (509) 477-7577. She is happy to share information on the programs, activities and collaborative efforts. We also recommend viewing the Water Resource Center in online photos at https://goo.gl/maps/SvFShEFFKUs where you'll find a virtual tour.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
2016 Education & Outreach	30% increase in events over 2015 (127 events)	31% increase in events over 2015 (134 events)
2017 Education & Outreach	10% increase in events over 2016 (149 events)	5% increase in events over 2016 (141 events)
Customer Service	Rate Our Service: High or Very High	In Rate Our Service categories, 85% or more of respondents rank us high or very high.
Customer Service	Overall Experience: Matched or Better Than Expected	In Overall Experience category, 95% of respondents rank their experience as either Matched Expectations or Better Than Expected.
Workplace Safety (Wastewater Operations)	Zero workplace injuries	2016 to 2018 (to date): No loss of time or claim paid injuries.



Utility Description (combine all plants if a multi-site system)		
Utility Name: **St. Cloud Public Utilities**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Wastewater: single plant, regional system. Drinking Water: single plant Stormwater Utility		
Service Area (square miles): 91.1	Average Annual Daily Flow or Demand (MGD): Wastewater: 10 MGD Drinking Water: 7.5 MGD Stormwater: NA	
Population Served: Wastewater: 118,000. Drinking Water, Stormwater: 66,000		
Location		
Street Address: 400 2nd Street N		
City: St. Cloud State: MN	Country: USA	
Zip Code/Country Code: 56301		
Utility Representative Contact Information		
Name: Patrick Shea	Phone: 320-255-7225	Email: Patrick.Shea@ci.stcloud.mn.us
Current Program Members Only **Fill in this section only if the utility has been recognized as a Utility of the Future Today in prior years**		

In what year did the utility achieve recognition as a Utility of the Future Today? 2017
In which Activity Area(s) has the utility been recognized previously? Include all Activity Areas for which the utility received recognition in 2016 and/or 2017. __ Activity Area 1: Beneficial Biosolids Use __ Activity Area 2: Partnering & Engagement __ Activity Area 3: Energy Efficiency _X_ Activity Area 4: Energy Generation & Recovery __ Activity Area 5: Nutrient Reduction & Materials Recovery __ Activity Area 6: Water Reuse __ Activity Area 7: Watershed Stewardship

Watershed Partnering and Engagement

- St. Cloud Area Wastewater Advisory Committee: partnership of St. Cloud and regional wastewater partners.
- The Upper Mississippi River Source Water Protection Project (UMRSWPP): formed by the cities of St. Cloud, Minneapolis and St. Paul, who along with local units of government work together for Source Water protection of the Upper Mississippi River.
- Central Minnesota Water Education Alliance (CMWEA): which includes cities, counties, townships and other organizations in central MN that work together to promote water quality stewardship in the area. The St. Cloud Public Utilities Department is the lead entity and fiscal agent of the organization.
- Clean Teams: employee organized teams for focused neighborhood cleanups and projects.
- Beneficial Biosolids Re-use: the Biosolids Management Program is one of 22 nationally certified Platinum level agencies through the National Biosolids Partnership Environmental Management Program. The program recycles 12 million gallons of Class B liquid fertilizer product on area agricultural land and is in the construction phase to upgrade to Class A EQ Liquid Biosolids with struvite fertilizer recovery through the Ostara Pearl system (NR2 project).
- Nutrient Reduction and Materials Recovery: the Wastewater Services Division is a full biological removal facility and is in construction phase of the Nutrient Recovery and Reuse (NR2) project which will enable the production of Class A EQ Biosolids and struvite fertilizer by 2019.

Watershed Stewardship Community Commitment and Partnerships

- Mayor Dave Kleis's commitment to environmental and watershed stewardship through his co-chair activities at the national Mississippi River Cities and Towns Initiative; an organization committed to protecting the Mississippi River by promoting economic and environmental stability.
- Mr. Patrick Shea, Public Services Director, serves as a Governor-appointed representative to the Clean Water Council (CWC). An organization dedicated to clean water initiatives in Minnesota.
- The City is the founder, lead LGU and fiscal agency for the Central Minnesota Water Education Alliance (CMWEA) which includes 31 local cities, counties, townships and other organizations in central MN that work together to promote watershed stewardship. The mission of CMWEA is to develop and implement educational programs that encourage individuals in Central Minnesota to protect water resources by increasing their knowledge and encouraging simple behavior changes. CMWEA takes pride in connecting with people in Central Minnesota and encouraging them to take action to protect the area water resources.
- The City also takes an active role in the Minnesota Cities Stormwater Coalition (MCSC) where cities throughout Minnesota can easily share ideas and interact with state regulatory agencies such as Minnesota Pollution Control Agency (MPCA), the Department of Natural Resources (MNDNR) and the Board of Soil and Water Resources (BSWR).

Stakeholder Engagement

The City has multiple opportunities for the public to be involved in water stewardship initiatives. As well as the list below, the public is invited to comment at City Council, Planning Commission and Park Board meetings are given notice of any stormwater related items.

The public can find information and sign up to be part of the following activities through the City website: Adopt-A-Pond, Adopt-A-BMP, Community Clean Up, Annual Public Meeting, Storm Drain Marking.

y. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
Practices, activities, and programs related to Watershed Stewardship mentioned above were implemented as a result of proactive, innovative actions taken by Public Utilities team members and leadership. Goals are set and evaluated throughout the year, which resulted in continuous progress and success. Team members work with all local, state and federal stakeholders to capitalize on potential opportunities such as grants.

z. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
The Stormwater Utility has an operating budget of $349,000. Local, state and national grants, and cost share programs are the main source of funding for projects. The MN Conservation Corps has been utilized for maintaining tree planters and rain gardens since 2013. The MN Conservation Corps crew is trained in managing natural resources with specific skills and training to identify weeds and native species, control weeds and invasive species, and use necessary tools and equipment to maintain green infrastructure. A five-person crew assists the City with routine spring/fall vegetation maintenance, weed control and sediment removal maintenance of City owned rain gardens and tree planters.

aa. Did you partner with other stakeholders or organizations as a part of your implementation process? The Stormwater Division routinely works with (not an inclusive list): five surrounding cities, three counties in which St. Cloud lies, neighborhood coalitions, watershed districts, soil and water conservation districts and state regulatory personnel. Partnership, communication and sharing of ideas with all of the above are vital to the continued improvement of the division and area water quality.

bb. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
Environmental and water stewardship is thankfully becoming a more common and accepted reality however the Utility continues to fight pushback on the needed rate increases to meet the budget requirements of the Stormwater Division. The public perspective that the Stormwater User fee is 'just another tax' is ongoing and an obstacle that all similar utilities face. The City has a strong Public Education and Outreach Program and is currently using this program to overcome the hesitation to increase rates to support the program.

cc. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
Modelling is routinely used to determine the cost benefit analysis for project before they are initiated/ implemented.

dd. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
Stormwater page on the City website:
http://ci.stcloud.mn.us/337/Stormwater-Utility
Raingarden GIS Storybook:
https://coscgis.maps.arcgis.com/apps/MapJournal/index.html?appid=feb9827cb3b54bfd9c817ece817dae6d
Central Minnesota Water Education Alliance (CMWEA) website:
http://www.h2oumn.com/

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Adopt A Road/Pond	Involve City residents, businesses and organizations in pollution prevention	Consistently maintain adoption of the priority ponds and road sections.

	implementation and water quality awareness. Maintain adoption of at least the 5 priority ponds and 10 priority road sections for trash pick-up.	Assistance provided by at least 15 volunteer groups annually.
Stormdrain Marking	Increase public awareness about where stormwater runoff goes by creating an opportunity for the public to be involved with the stormwater program.	Since 2007, 7,856 stormdrains have been stenciled by 635 volunteers.
Northeast Stormwater Improvements Project	Modelled Annual Removal: 19.7 Lbs of Phosphorous 10,200 Lbs of sediment 14.5 Million Gallons of water treated 368,600 gallons of storage	Estimated annual removal: 21.2 Lbs of Phosphorous 11,250 Lbs of sediment 14.5 Million Gallons of water treated 368,600 gallons of storage
Education & Outreach	Reaching multiple audiences to increase general awareness of water quality protection in the area.	Clean Water Pledges – 300. Clean Water Bingo (new 2018) – 18. Photo Booth 2015 – present: 1,985.
New Street Sweeper	Increased removal of solids and phosphorous. Purchased in 2015.	Sediment removal, yards per year: 2015 target: 3,000. Actual: 4,562 2016 target: 3,000. Actual: 3,494 2017 target: 3,000. Actual: 3,932

Utility Description (combine all plants if a multi-site system)		
Utility Name**: The Great Lakes Water Authority**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional water/wastewater system		
Service Area (square miles): 1069 (water) / 988 (wastewater)	Average Annual Daily Flow or Demand (MGD): 625 MGD	
Population Served: 3.9 million (water) / 2.9 million (wastewater)		
Location		
Street Address: 735 Randolph St.		
City: Detroit	State: Michigan	Country: U.S.
Zip Code/Country Code: 48226		
Utility Representative Contact Information		
Name: Michelle Zdrodowski	Phone: (313) 224-4739	Email: michelle.zdrodowski@glwater.org

Organizational Culture

The Great Lakes Water Authority (GLWA) strives to achieve its mission of exceeding our customers' expectations by utilizing best practices in the treatment and transmission of water and wastewater, while promoting healthy communities and economic growth. We recognize that the key behind employing those best practices lies within the abilities of our highly skilled team of professionals. Our tagline One Water; One Team, embodies the value we put on a collaborative organizational culture.

Since our stand up in 2016 as an independent regional water and wastewater authority, GLWA has made the recruitment and selection of talented and qualified individuals a key focus for our future success.[4] The Authority utilizes its local and regional partnerships to recruit talent and always has a strong presence at job fairs and recruiting events in its customer communities and at a variety of workforce development organizations. We also use our social media channels, as well as several online recruitment tools, including Glass Door, which allows for comments to be posted by current team members and potential job candidates.

The Authority recognized early on the challenges of finding suitable talent with skilled trade experience to fill a variety of critical roles within our operations. To fill this talent gap, we implemented our first Apprenticeship Program for Electrical Instrumentation Control Technicians. In partnership with Focus: Hope, a Detroit-based non-profit organization, and Henry Ford Community College, the three-year program provides both an on-the-job training component, as well as extensive mentoring with GLWA Journey Workers for 20 apprentices. At the completion of the program, apprentices can earn their journey worker's card and receive full-time employment with GLWA. In fact, our inaugural Apprenticeship Program was such a success, we are launching a second program for Maintenance Technicians this fall.

In addition to our forward-thinking Apprenticeship Programs, we are focused on professional development for all of our team members. To ensure that we are continuing to grow and nurture our talent, we are developing the One Water Institute (OWI). Launching this summer, the OWI will have six academies with classes in each of the following areas: safety, water operating services, wastewater operating services, technology, leadership and emerging leaders.

Ultimately, through the OWI, it is our goal to increase team members' knowledge and abilities resulting in increased satisfaction and engagement, lower turnover, 100 percent passage on technical exams, less employment-related grievances and litigation, and 100 percent proficiency on technology competencies.

To further ensure that our leadership-level team members are kept abreast of the latest information on the Authority, our CEO and Executive Leadership Team conduct a quarterly Leadership Team meeting, where a broad cross-section of management training exercises, information and dialogue are provided about issues affecting the Authority.

GLWA utilizes a system of broad job classifications that allow for team member career progression through acquiring knowledge, training and skills. We conduct yearly performance evaluations of all team members, which includes training and development assessments and recommendations. Several of our classifications have established progression levels. The performance evaluation assists our leadership team members in assigning work that supports the progressions within specific time parameters and allows team members to have more control of their progression within their assigned classifications. Each team member has the opportunity to advance in their progression annually by acquiring the required skills and abilities. We have found that this method eliminates upward movement limitations inherent in traditional government organizational structures and provides momentum to build a sustainable workforce.
Keeping team members engaged is also a top priority. We strongly believe that having an engaged, "in the know" workforce is an essential element to our becoming the provider of choice for water and wastewater services in southeast Michigan. To help us in this endeavor, we added an Internal Communications Specialist to our Public Affairs Team, whose sole focus is on making sure that we are constantly sharing relevant and interesting information about Authority activities, opportunities, and initiatives with our team members. With this Communications Specialist's assistance, over the last year we have initiated a bi-weekly newsletter, added a Young Professionals peer-to-peer mentoring group, refocused our quarterly magazine (written by team members, for team members) to include more profiles and human interest stories, added communications centers with video monitors to all of our facilities, and begun a peer-to-peer recognition called "Making Big Waves," where team members can call out their peers for going the extra mile to make our workplace a great place to be.

Further, to ensure that the information we are sharing is what our team members want/need, we conduct an annual internal communications survey. Insights gathered from the surveys have helped us not only refine our communications tools, but also our messaging. In fact, in our first survey taken in 2017, we learned that our team members wanted more information shared in face-to-face settings.

[4] At the time of GLWA's stand-up on January 1, 2016, approximately 30% of its organizational positions were vacant. Today that figure has been reduced to approximately 10% as new team members and initiatives come on-line.

One way we are working that into our efforts is through town hall-style meetings with our CEO being held at each of our facilities. At these meetings our CEO walks our team members through the highlights of our annual Year in Review report and conducts a Q&A session. This year, we added new elements to the facility visits: 1) our CEO tours each facility just prior to her presentation to talk with team members in their work locations, and 2) she offers a drawing for five team members to have "Coffee with the CEO." Both of these new elements offer her the opportunity to gain feedback in a more casual, personalized manner.

Our focus on becoming a Utility of the Future has also led us to begin using Effective Utility Management (EUM) to guide us in our path toward effective and sustainable operations. GLWA's commitment to EUM bears out in the development of a series of Key Performance Indicators (KPIs) for each of our operating areas. These monthly and quarterly KPIs measure progress on everything from cash reserves (financial viability) to effluent phosphorus levels (product quality) to the retention of team members (employee development), as well as how much of our messaging is being "pulled through" into the media coverage we are garnering (stakeholder understanding and support). In 2017, we received acknowledgement of our EUM efforts when the Association of Metropolitan Water Agencies (AMWA) awarded us its Gold Award for Exceptional Utility Performance. In addition to our strong financial performance and focus on team member development in our first year of operations, AMWA called out the launch of our WRAP (water residential assistance program) Program that provides qualified households within our regional service area not only bill assistance, but also home water conservation audits, conservation education and minor plumbing repairs. In its second year, WRAP water conservation audit participants saw an average of $420 in water savings per home after their audits were conducted and minor plumbing repairs were completed. To date, 75 of 103 eligible communities in our service area are enrolled in the program.

Although GLWA has completed just two years of operations, we believe that we have made great strides in our efforts to become a Utility of the Future. Together with our team members and those we serve (we call them member partners not customers in the true spirit of collaboration) we remain committed to be a learning organization that is in service to the communities we serve.

Beneficial Biosolids use

In 2012, the wastewater treatment plant was facing the perfect storm, challenges of an Administrative Consent Order requiring increased solids disposal capacity, two aging incineration complexes which needed refurbishment and the impending incineration MACT compliance date requiring improved emissions controls. A two-day biosolids symposium was held, and the resulting recommendation of a panel of experts was drying and beneficial use of the product with a refurbishment and emissions control upgrade to the system's Complex II Incineration. This path enabled the cancellation of capital projects for Complex I Incineration refurbishment, centrifuge replacement, biosolids storage and avoided a project for Complex I emissions upgrade. Part of the interim strategy for increasing biosolids disposal was to restart the land application of biosolids while maximizing use of aging incinerators and available landfill capacity.

An RFP was issued for a design-build-operate-maintain biosolids drying facility, and upon its completion, a 20-year contract was entered for a design, build, operate and maintain of 316 dry tons per day (firm capacity) Biosolids Drying Facility (BDF). The BDF became operational in February 2016. The contract includes responsibility for marketing and beneficial use of all product. Additionally, the contract establishes requirements for the electrical and gas utilization for the drying and pelletizing processes per dry ton handled. The 20-year contract contains a fixed monthly price for quantities up to 73,000 DTPY, with incremental costs per excess dry tons up to 140,000 DTPY. The cost escalation is tied to indices and thus, provides long term cost certainty.

The BDF was constructed using efficient construction techniques such as setting large equipment before wall and roof placement and ground level silo construction using jacking and energy efficient design, state-of-the-art process controls and web-based asset management. The design netted $3.5 million in State Revolving Fund principal loan forgiveness due to the "green" design, and $25,000 in energy efficiency rebates from the local utility. The facility is also the recipient of the American Council of Engineering Companies (ACEC)-Michigan 2018 Honorable Conceptor Award in Engineering, as well as the 2018 ACEC National Honor Award.

The pelletized product land applied by the contractor, New England Fertilizer Company (NEFCO), contains on average 74 pounds of nitrogen per ton and 40 pounds of phosphorus per ton. This provides the farmer with a

fertilizer savings in the range of $20 to $50 per acre versus chemical fertilizers, improves crop yields and promotes plant establishment. Additionally, land application sequesters carbon. Shipping Class A dried product essentially results in one quarter of the miles driven compared to Class B (wet lime stabilized biosolids). This practice saves 162 gallons of fuel for every 1,000 miles of trucking reduction and reduces CO_2 by 1.8 tons. Repeated application on farm land leads to better root development and increased water retention. Land application is fully compliant with regulations governing application rates of nitrogen and phosphorus and handling. Biosolids produced at the BDF are currently permitted for land application in Michigan, Ontario, Ohio and Indiana. Since becoming operational in 2016, over 172,000 dry tons of pelletized biosolids product have been land applied in lieu of incineration, Class B land application and landfilling. Greenhouse gases generated by on-site processes, Scope 2, fell by 40,724.78 tons CO_2 equivalent from 2015 to 2016.

With the changing regulatory landscape and public perception of biosolids always of concern, NEFCO is continuing to seek alternate uses for the biosolids pellets. Due to the characteristics of the product, the most promising avenue is use as a fuel. The Michigan Department of Environmental Quality (MDEQ) recently issued an air permit to a southeast Michigan lime kiln to use biosolids as a fuel. The permit includes alternative fuel use for 90 days on a trial basis followed by full scale up after successful stack testing. A pilot storage and fuel delivery system are being procured for installation at the lime kiln and trial burns on one kiln line are anticipated in October 2018. Fuel substitution testing up to 25 percent of total BTU requirements will be performed to determine what fuel composition is ideal to keep ash buildup in the kiln at acceptable levels. This is a promising avenue as many fuel users are located within a few miles of the BDF and penetration of this opportunity would result in a large reduction in GHG, the result of reduced trucking of the pellets and elimination of a portion of the fossil fuel (generally coal) currently used by local production facilities. NEFCO has also begun exploring sales in smaller volume bulk bags (less than 2000 pounds) for the golf course maintenance and professional landscaping markets.

a. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
   Due to engineering staffing levels and lack of in-house expertise, a consultant was used to research and write the Design, Build, Operate and Maintain (DBOM) RFP and contract agreements. The biosolids dryer project remains the first DBOM for GLWA. GLWA performs ongoing project management and oversight. The DBOM contract stipulates performance of the vendor, cost increases, dispute resolution, creation of a marketing plan, maintenance requirements and facility condition at the end of the operation period.
b. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
   Consensus on the direction was obtained during the biosolids symposium, Board of Directors support was critical to issue and approve this unprecedented 20-year DBOM contract, financing was obtained for a total of $134 Million, $102.5 Million in State Revolving Funds with the remaining from the bond market. A third-party consultant was instrumental to supporting the project management during construction. The daily scheduling of quantities to be delivered to the disposal alternatives, invoice auditing and approval and contract management is covered by one internal FTE.
c. Did you partner with other stakeholders or organizations as a part of your implementation process?
   Communication with neighborhood and environmental groups was critical to the acceptance of this facility. The public was concerned it would further degrade air quality and was confused over the differences between drying and incineration. In the end, the community was persuaded, in no small part, due to the two-thirds reduction in trucks leaving the wastewater treatment facility. The biggest challenge for partnering with a stakeholder was learning how to accept and manage a third-party design, build, operate and maintain contract.
d. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
   Organizational and Board of Directors acceptance of a 20-year DBOM agreement was the most critical hurdle. This was accomplished by a sound business case that included full cost accounting, including labor and maintenance over the 20-year period. The annual Operations and Maintenance (O&M) savings was estimated at approximately $16.9 million, and 20-year O&M savings at approximately $337 million, with an 8.5-year payback on the $143 million capital cost.
e. Has “smart” information technology supported your implementation/optimization in this area? If yes, please describe.

Our partner, NEFCO, employs state-of-the-art control systems with a data historian and a web-based, bar coded asset management system which enables accurate tracking, automated controls, and planned maintenance all with an effective and efficient use of resources. This 24/7 operation is managed with a full staffing number of 27 FTE.

f. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
Information on the BDF can be found in each of GLWA's two Year in Review reports, which are located on our website, www.glwater.org. Our partner, NEFCO, also has information on its website, http://www.nefcobiosolids.com/view-our-projects/detroit-mi/. The MDEQ has also featured the BDF in one of its publications, The Loan Arranger: https://www.michigan.gov/documents/deq/deq-ess-mfs-newsletters-f17_606359_7.pdf.

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
Gas and Electric use per dry ton	Not to exceed 89.4 Therms/DT gas and 243 KwH/DT electric.	The BDF has been at or below these requirements. Averaging to date - 69 therms/DT and 168 kWh/DT
Biosolids Handling by method	Maximize biosolids drying for use as fertilizer	The use of incineration and landfill has plummeted. For calendar year 2017, 63% of the biosolids were handled by the dyer and land applied.

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Toho Water Authority**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): **Regional System– including potable water, water reclamation and reclaimed water systems**		
Service Area (square miles): **Approximately 195**	Average Annual Daily Flow or Demand (MGD): **35**	
Population Served: **322,900**		
Location		
Street Address: **951 Martin Luther King Boulevard**		
City: **Kissimmee** State: **FL**	Country: **United States**	
Zip Code/Country Code: **34741**		
Utility Representative Contact Information		
Name: **Michael Sweeney**	Phone: **407-944-5129**	Email: **msweeney@tohowater.com**

Organizational Culture

As the largest provider of water, wastewater, and reclaimed water services in Osceola County, Florida, Toho Water Authority (TWA) strives for continual improvement and excellence in every aspect of the organization. TWA's mission is to provide reliable, cost effective and responsive water services to its customers while protecting public health and the

environment. TWA's 320 employees stand behind the vision to be the standard of excellence for responsible water supply stewardship.

To ensure that TWA is adhering to its mission and vision, TWA measures its levels of service against 46 key performance indicators (KPI) in six different categories: Infrastructure Reliability, Organizational Responsiveness, Regulatory Compliance, Customer Service Performance, Financial Performance, and Workforce Initiatives. By measuring performance in these six categories, needed improvement and suitable solutions can be quickly implemented.

For 11 consecutive years, TWA has been recognized by the Orlando Sentinel as one of the Top 100 Employers in Central Florida for Families. This recognition has helped attract and retain top talent in the current competitive job market. To retain talent, TWA relies on several strategies. First, TWA conducts a compensation study every few years to ensure compensation and benefits remain competitive within the industry. TWA has built a robust training program to ensure that TWA's employees have the training opportunities needed for career advancement. Since the training program was established, onsite training hours have increased 29% from 5,977 hours to 7,724 hours. TWA's training coordinator also developed the TWA Institute, a program that all employees go through to learn and better understand the various departments and functions at TWA. Feedback from employees indicate these and other strategies effectively promote a culture of cooperation and unity among different departments and work groups.

TWA recognize the importance of succession planning as the workforce grows. Skill Based Pay Programs were developed for the Treatment Operations, Field Services, and Customer Service departments to help meet three important objectives:

1. Set out well-defined career paths for operators and technicians for career advancement.
2. Help improve asset performance and useful life by placing an emphasis on preventative maintenance and other skill based efforts.
3. Provide the opportunity for additional compensation.

In 2013, TWA and the City of Kissimmee partnered to establish a joint onsite medical clinic for employees and their families to promote wellness. Today, the clinic serves up to 40 patients per day and offers primary care, preventative care, and occupational care services at no additional cost to employees. Overall, the clinic is improving health and avoiding preventable medical costs.

In 2014, TWA established the Innovation Rewards Program (IRP) to encourage and reward employees for cost saving ideas. TWA also offer employees a generous tuition reimbursement benefit and a telecommuting program for eligible employees.

Employees receive a quarterly gainsharing bonus for meeting individual and team goals. This bonus allows for a maximum of $1,200 additional compensation annually for each full time employee.

To ensure that employees are fully involved, a Voice of the Employees (VOTE) committee meets every quarter with the Executive Director, Deputy Director, and Director of Human Resources to discuss concerns and opportunities for improvement. In addition to the VOTE committee meetings, the Executive Director also conducts quarterly meetings at all field locations and facilities to keep all employees updated and engaged.

As part of TWA's commitment to continuous improvement, the Treatment Operations department has maintained an ISO 14001 certified Environmental Management System for over 7 years. Adhering to this internationally agreed upon standard helps organizations and TWA improve performance and processes through internal and external operation audits. In May 2018, TWA once again passed the ISO 14001:2015 registration audit, certifying that TWA's plants and staff meet the recent updates to the ISO 14001 standard.

Partnering and Engagement

Partnering

Community partnerships form the cornerstone of TWA's success. TWA is a lead organization of the Central Florida Water Initiative (CFWI). The CFWI is a partnership between the three Water Management Districts (WMD) in central Florida,

state agencies, utilities, business leaders, agricultural interests, environmental interests, and other interested stakeholders. The purpose of this collaboration is to develop strategies to meet current and future water demands in ways that protect the environment and promote sustainability and conservation. TWA's Executive Director Brian Wheeler is the designated utilities representative on the CFWI Steering Committee. Deputy Director Mike Sweeney, and other staff members serve critical roles on CFWI support teams.

In 2011, TWA entered into a partnership with the City of St. Cloud, Orange County, and Polk County to form the Water Cooperative of Central Florida (Water Coop). The Water Coop's objective is to plan, design and construct water projects based on the CFWI efforts and share the cost. A significant accomplishment that came from the Water Coop partnership so far was executing a water wheeling agreement. Together, the utilities invest in transmission lines to share permitted water allocations to meet the water resource needs as a region and an alternative to constructing more expensive alternative water supplies.

The Cypress Lake Project is the Water Coop's principal alternative water supply project. At completion, the Cypress Lake Water Treatment Plant and associated wellfield and water transmission system will provide the utility partners with a minimum of 30 million gallons per day (MDG) of water. The plant will rely on reverse osmosis to treat the brackish groundwater supply and deep well injection to manage the RO concentrate byproduct. At present, the project is currently in the land acquisition phase.

A. **How did you go about implementing the practices/activities/programs that you described in your Overview paragraph?**
TWA places a high importance on being leaders and contributors to the various community and industry partnerships. In this example, the work of the CFWI and the Water Coop is of vital importance. Without these partnerships, TWA and other members would individually not be able to develop independent solutions to meet future water demand.

B. **What type and amount of resources were needed to support implementation?**
For starters, TWA staff has dedicated hundreds of hours to these efforts and continues to place a high value on participation and measurable accomplishments. TWA understand that success happens when all involved organizations are informed and contribute. For the Cypress Lake Project alone, TWA has contributed 40% towards the project. At completion, TWA's financial share of the costs is expected to be over $100 million.

C. **Did you partner with other stakeholders or organizations as a part of your implementation process?**
Yes, TWA has partnered with all of the regional stakeholders and the local, state and federal agencies (three Florida WMDs, Florida Department of Environmental Protection, local utilities, and various interests as mentioned previously).

D. **What is the most critical obstacle that your utility had to overcome to be successful in this activity area, and how did you do that?**
The most critical and challenging obstacle was getting the different CFWI stakeholders to sign on to a common set of guiding principles. Each stakeholder comes to the table with a different set of tools, permitting procedures and expectations. That made finding common ground challenging, but agreement to a set of principles was reached.

A technical obstacle that was encountered was the consolidation and development of a multi-district groundwater availability model that met the acceptability criteria of the various stakeholders. The model was completed, accepted and continues to be refined.

E. **Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.**
The CFWI and Water Coop partnerships have relied on the U. S. Geological Survey, the WMDs and specialists to provide a three dimensional groundwater and surface water model that encompasses the entire CFWI area. This state of the art model relies on huge amounts of current and historic time series data and significant computation

time to run scenarios. Results are driving decisions and allowing for accurate planning for future alternative water supply projects.

F. **Where could other utilities go to find additional information on this activity area or the activities/practices/programs that you implemented?**
The CFWI group has a webpage dedicated to the efforts described - www.cfwiwater.com
The Water Cooperative of Central Florida has a webpage- www.watercoopcf.com
TWA website (www.tohowater.com) is another resource that can be used to obtain more information on ongoing and upcoming projects.

Measure	Targets	Outcomes
Adherence to the Cypress Lake WTP and Wellfield construction schedule through the Water Coop partnership.	Construct a 30+ million gallons a day facility and associated wellfield and water transmission system to meet current and future water needs in the central Florida region.	The project has been permitted and it currently in the design phase.
Number and degree of areas indicating water demands that are in excess of the sustainable yield of existing traditional groundwater sources.	Have effective potable and reclaimed water strategies in place to meet the increasing water demand of TWA and the Central Florida region in the most cost effective manner.	Alternative Water Supply projects have been identified and several are in the design phase.
Potable and reclaimed water irrigation savings resulting from various conservation programs enacted by TWA	TWA's goal is to encourage customers to conserve water through audits, rebates and enforcement of the water use restrictions established by the WMDs.	Programs have so far resulted in reducing demands ranging from 14 to 38 gallons/day per affected account.

Engagement

TWA actively pursues community engagement through many different activities and initiatives.
In April 2017, TWA established the Toho Assistance Program (TAP) in partnership with the Osceola Council on Aging. The goal of the program is to provide financial assistance to qualifying customers that are struggling to pay for utility services. As of January, 2018, TWA has provided $17,246.17 to 167 families/households.

Toho Water Works Summer Camp - The goal of the Water Works summer camp program is to give middle school students the opportunity to develop an increased appreciation for the environment and an understanding of the important role water plays in everyday life.

Toho has developed educational curriculum that focuses around Florida-specific issues, habitats, and animals. Water Works is targeted at building a water conservation ethic in middle school students and teaching them practical ways to reduce water use.

Plant tours are available to high school students or civic groups upon request. Residents are able to visit a drinking water treatment plant to learn the four-steps of potable water treatment or learn about the six-steps of reclaimed water at one of TWA's water reclamation facilities. Participants learn how reclaimed water helps meet the needs for irrigating parks, golf courses and serving industrial users.

Every December, TWA hosts an annual Tree of Angels event with students from a nearby elementary school. The students are greeted by Santa Clause, his elves and the TWA choir. The student guests are served breakfast and afterwards escorted to receive gifts donated by TWA's generous staff. TWA also builds a float for the City of Kissimmee's annual Holiday Festival of Lights parade that promotes TWA and its mission to the community.

TWA and staff support and volunteers for worthwhile charitable events. TWA provides bottled water for events or sponsorships for organizations and/or events that include: FSAWWA Water for People, Guardian Ad Litem, Viva Osceola, March for Meals, Osceola County Historic Society, Rotary, Boys and Girls Clubs, and the local YMCA center and many others.

TWA employees have participated in the construction of Kaboom! Playgrounds in neighborhoods around the county. Kaboom! is a national non-profit that seeks to provide children, especially those living in poverty, safe places to play. Six playgrounds have been built with the next one scheduled for later this year. For more information, visit website www.kaboom.org or http://communityvision.org/event/kaboom-playground-build/.

In 2011, TWA elected to phase in all of the customer service functions from an outside provider to better serve customers. This was a challenging effort that required transitioning to a new Customer Information System, new business processes, and approximately 40+ new customer service representatives, billing and collection analysts, and field services technicians. The transition was completed in 2017 and has allowed TWA to have full control over the entire customer service experience.

A. **How did you go about implementing the practices/activities/programs that you described in your Overview paragraph?**
   All of the different activities and programs described here have been successfully implemented due to the hard work and dedication of TWA staff. Creating and executing well thought out plans with flexibility, measurable outcomes and internally and externally inclusiveness were always the keys.

B. **What type and amount of resources were needed to support implementation?**
   Some of the programs like TAP and the various sponsorships require financial resources. Most programs also rely on considerable volunteer time (examples include: Tree of Angels, Festival of Lights parade, Water Works summer camp).

C. **Did you partner with other stakeholders or organizations as a part of your implementation process?**
   Yes, TWA has relied on partnerships for all of these activities and programs. For example, the Osceola Council on Aging is the primary partner in the TAP program. Through them, TWA can identify the members of the community that can most benefit from the program. TWA also partners with the City of Kissimmee and Osceola County on several ongoing efforts that support the community as a whole.

D. **What is the most critical obstacle that your utility had to overcome to be successful in this activity area, and how did you do that?**
   A critical obstacle that is addressed is to be more proactive rather than reactive. A recent survey of community stakeholders said that TWA needs to advertise its programs more widely. Providing information of upcoming news widely, whether it be reclaimed or potable irrigation usage, construction projects, changes to treatment operations, or general education awareness now has even greater emphasis. TWA has updated the uses of technology and social media to make sure TWA is also more visible at community events.

E. **Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.**
   TWA utilizes Advanced Metering Infrastructure (AMI) to automate over 500,000 meter reads per day. This allows the continuous monitoring and analysis of water consumption data to help inform and support customer conservation efforts. Recognizing the creation of a water conservation partnership with customers is among the most cost

effective strategies, TWA is implementing software that informs and alerts customers about water usage via smartphones using AMI data.

F. **Where could other utilities go to find additional information on this activity area or the activities/practices/programs that you implemented?**
More information on these programs can be found on TWA's website (www.tohowater.com)

Measure	Targets	Outcomes
Customer Service Key Performance Indicators (KPIs)	Meet the KPI target for all eight of the department's KPIs.	As of the last monthly report, the department has met all 8 customer service KPI targets.
Community outreach surveys	Continue to develop and improve on customer and stakeholder communications.	Feedback from surveys In addition to the website, Facebook, Instagram and Twitter is incorporated into TWA's programs.
Toho Assistance Program (TAP) mentioned previously	The FY2018 budget for the program is $50,000. Several demographic and financial background are anonymously tracked.	Over 167 families have been provided financial assistance so far.

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Washington Suburban Sanitary Commission**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional System (Montgomery & Prince George's Counties of MD; consists of 2 water plants & distribution system + collection systems & water resource recovery facilities)		
Service Area (square miles): 1,000 square miles (approx.)	Average Annual Daily Flow or Demand (MGD): 160 MGD	
Population Served: 1.8 million served		
Location		
Street Address: (Corporate Headquarters) 14501 Sweitzer Lane		
City: Laurel,	State: Maryland	Country: United States of America
Zip Code/Country Code: 20707		
Utility Representative Contact Information		
Name: Joe Mantua	Phone: 301-206-8777	Email: James.Langley@wsscwater.com

Organizational Culture

Under the leadership and guidance of General Manager and CEO Carla A. Reid, WSSC is a Utility of the Future in creating an organizational culture where employees, stakeholders and community members feel valued, inspired and empowered. General Manager Reid's three-pronged philosophy of Simplify, Focus and Connect - coupled with a strategic priority to Inspire Employee Engagement - serve as the cornerstones of a carefully developed suite of programs

that meet the demands of an ever-changing organizational culture. The following narrative provides a snapshot of initiatives focused on employee, community and stakeholder engagement – all of which are led by employees and work seamlessly together to enhance our organizational culture.

Employee Engagement

There are a variety of programs at WSSC that help inspire employee engagement and create a world-class organizational culture – all falling under the umbrella of #H2OPeople. Chaired by employees, the #H2OPeople committee is responsible for developing ideas to support and engage our 1,700-strong workforce. One very popular internal #H2OPeople activity is Take a Co-Worker to Work Day, which launched in November 2017. Through this bi-annual program, employees can request to shadow any colleague, manager, or individual in a different department to learn what that person does and how it relates to their own duties and responsibilities. Take a Co-Worker to Work Day is a well-received program that promotes teamwork and a greater understanding of the variety of jobs performed throughout WSSC.

To celebrate our #H2OPeople, we recognize commitment to the organization through our bi-annual Employee Service Awards. These awards recognize employees' years of service - from five years all the way up to one employee with 45 years of service just this past January! These awards are live-streamed on our intranet so employees at all work locations can watch and cheer on their colleagues.

To thank and celebrate all employees for their service, we join together for our annual Employee Appreciation Picnic and Rodeo. With games, food and even an internal "tapping" competition, the picnic and rodeo are excellent opportunities for employees from all work locations to connect and build relationships.

General Manager Reid is personally involved in enhancing organizational culture through her signature event, Us Teaching Us. Knowledge transfer is at the heart of this monthly, after-work activity where employees can sign up to teach a class on a particular topic or hobby they possess. Examples include public speaking, abstract painting, vision boards and healthy eating. General Manager Reid also host yearly Come In Unity Meetings – providing employees a chance to talk with the GM, ask questions and learn about upcoming programs and initiatives.

While on the topic of healthy eating, WSSC also makes a great effort to care for and nurture the health and well-being of our employees through our well-being program, MyLife. Through MyLife, employees have access to confidential coaching for health, life, work and relationships as well as a nutritionist, diabetes support, and many other program offerings. This includes extensive monthly programming for employees as well as a MyLife Advocate who travels to all WSSC work locations and meets with employees.

Leadership development is key to employee engagement. To that end, General Manager Reid has implemented a series called Leaders on the Same Page (LOSP), which occurs three times a year - March, July, and October. This is an all-management meeting of nearly 250 managers that consists of three parts: How leaders are expected to be; What leaders are expected to know; and What leaders are expected to do. Each LOSP meeting focuses on one of our five strategic priorities and always includes a focus on employee safety, which is covered under the strategic priority: Protect Our People, Infrastructure, Systems, and Resources. The LOSP meetings also include an opportunity for managers to collaborate and problem-solve current issues facing the Commission and obtain crucial information to cascade throughout the entire organization.

Throughout our 100 years of service to our community, WSSC has been an innovator. That same problem-solving spirit is at the heart of our recently launched Innovation Hub – a new online tool for employees to submit new and innovative ideas. Submitted ideas are reviewed and selected based on specific evaluation criteria, level of impact and best chance for success. WSSC's Engineering and Environmental Services Team also hosts brainstorming workshops to discuss solutions to staff-identified problems that can help us be more efficient, reduce operating expenses and achieve our strategic priorities. Once the workshops are complete, our innovation team compiles the ideas into a working document and asks the participants to rank the ideas. Working groups at each site will continue to work through the highest priority ideas and develop a plan for research or implementation.

Stakeholder Engagement

In celebration of our centennial, WSSC held a signature stakeholder engagement event on May 1 - our actual 100th birthday. WSSC's Water Symposium provided an opportunity for water resource professionals to gain increased

awareness about emerging technologies and trends in the water industry from experts in utilities, academia, government and the private sector. Plans are already underway to develop future stakeholder symposiums based on the positive feedback received by participants at this regional event.

Connecting with our private-sector stakeholders and helping to enhance relationships within the business community is the focus behind our premier business outreach event: Tap Into Business @ WSSC. This year, we incorporated several smaller business outreach gatherings into one comprehensive event that offered breakout sessions to help companies submit winning proposals. A key part of this event is the networking session, which provides an opportunity for smaller firms to connect with large businesses in need of specific subcontracting needs.

In March 2016, WSSC launched the Customer Feedback Community (CFC) – a pre-screened mix of 120 residential and commercial customers that match the demographical diversity of the counties we serve. This online and in-person stakeholder group responds to questions, surveys and activities about WSSC products, services, people and initiatives. The CFC allows WSSC to utilize the latest technologies, research, best practices and expertise to provide a measurable, qualitative and quantitative approach to obtaining customer feedback.

Community Engagement

#H2OPeople are also involved in broader community engagement activities. So far this fiscal year, we have participated in 41 community outreach events across Montgomery and Prince George's counties. These events include charity walks, community fairs, elected official constituent meetings and educational fairs. We have also conducted 61 environmental education programs with local school children engaged in activities including fish releases, tree plantings, aquatic habitat shelter construction and watershed stewardship lessons. Additionally, last year we hosted 21 Science, Technology, Engineering and Math (STEM) programs to help get the next generation interested in careers in the water industry.

Our community outreach staff held six train-the-teacher sessions in both Montgomery and Prince George's County schools, educating teachers on how to facilitate hands-on learning in environmental, water-related, and fats, oils, and grease (FOG) programs. In addition, we developed FOG curricula that is approved by Prince George's County Public Schools and taught to all sixth-grade students in the county.

Finally, through our #H2OPeople Giving Campaign, WSSC employees raised $95,739 to support United Way programs. The total raised was nearly 106 percent of our goal with nearly 40 percent employee participation. The campaign even raised nearly $20,000 for WSSC's very own Water Fund – dedicated to helping those customers struggling to pay their water/sewer bills.

As you can see, WSSC has made creating an organizational culture where employees, stakeholders and community members `feel valued, inspired and empowered a top priority. As we embark on our second century of service, we know we must constantly evaluate existing programs and research new initiatives to ensure we continue to be a Utility of the Future.

Energy Generation & Recovery

WSSC initiated its commitment to "energy generation and recovery" in 2008 when it purchased 85% of the real-time output of a 29.1MW wind farm in Pennsylvania. The contract lasted 10 years, from 2008-through 2017, to power WSSC facilities. Since the expiration of the wind power contract, WSSC has purchased Wind Renewable Energy Certificates (RECs) covering 100% of WSSC's total annual electricity consumption. WSSC is currently looking to partner on another direct wind farm development project, with the goals of covering 30% of our annual electricity consumption, and starting in June 2019. In 2013 WSSC committed to a 20-year power purchase agreement from a 2MW solar array at our Seneca WRRF and another 2MW solar array at our Western Branch WRRF. WSSC is also finalizing a 20-year purchase power agreement contract on an additional 4-6MW of solar power.

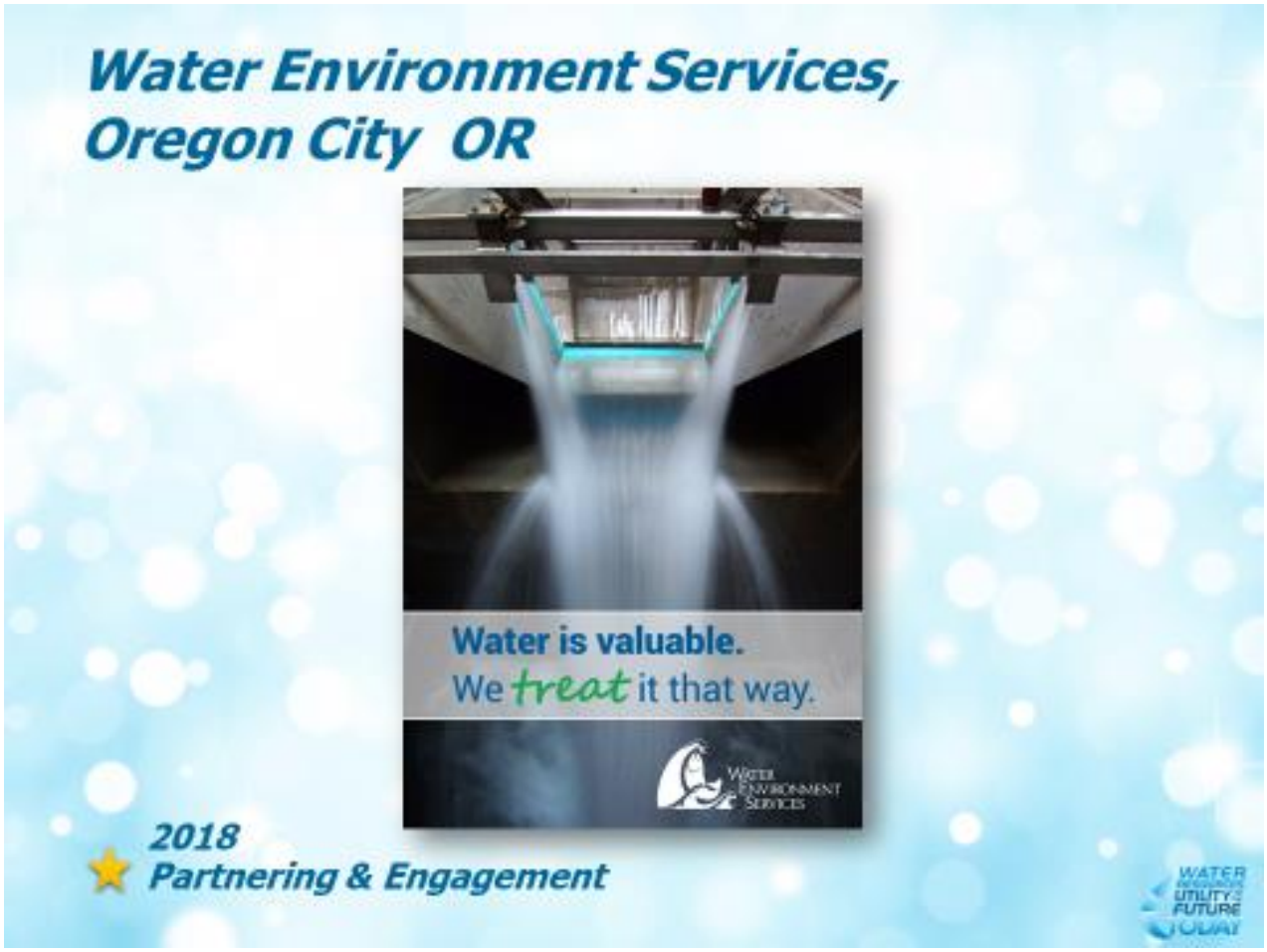
WSSC has relied upon hydro-power since 1950s to pump flow from our Duckett Reservoir's Rocky Gorge Pump Station to the Patuxent WTP, and the three 750 HP turbines were rebuilt in 2012 with the goal of lasting another 50 years. Plans are in place to evaluate and possibly pilot the addition of in-pipe-hydro systems at two of our Pressure Reducing Valve (PRV) Vaults, as well as at the base of the Duckett Dam, where there is a mandatory flow-by requirement.

In 2017, WSSC completed development of the Piscataway BioEnergy design criteria documents and in 2018 awarded a progressive design build contract to build this new $190M (approximate) facility; design and site preparation begins in mid-2018. This state-of-the art facility, will centralize all of WSSC's unstabilized biosolids (60-70 dry tons/day annual average), pretreat with thermal hydrolysis, then anaerobically digest the biosolids to produce biogas. A combined heat and power (CHP) system will produce approximately 2.8MW power for the Piscataway WRRF, using the waste heat to produce the steam fed to the CAMBI thermal hydrolysis system. The overall energy efficiency of the system will be >= 60%. The renewable natural gas generated by the anaerobic digesters will be cleaned up to pipeline quality and purchased by a regional municipal bus fleet.

These strategies will reduce our Green House Gas footprint – where we are committed to a 10% reduction every 5-years - dropping from 140,000 tonnes CO2e in 2005 to 70,000 tonnes CO2e projected for 2030.

1. How did you go about implementing the practices/activities/programs that you described in your Overview Paragraph?
   Planned first, performed internal financial analysis of potential projects, in some cases hired consultants to perform feasibility studies and conceptual designs. For Bio-energy project, obtained a $570,000 grant from DOE to perform feasibility study, which led to the development of a commercial project.
2. What type and amount of resources were needed to support implementation? (e.g., financial, staff, other)
   Energy Management staff of one (until 2015); two thereafter. Coordinated with WSSC Financial, Engineering & Construction, and Production staffs. Worked with outside consultants to provide needed expertise.
3. Did you partner with other stakeholders or organizations as a part of your implementation process?
   Yes- On the wind and solar Purchase Power Agreements, we partnered with private developers and solar providers. On the Bioenergy project, we are partnering with a Progressive Design-Build (PDB) firm; Progressive Design-Build is the most collaborative approach because it involves substantial input from both the owner and the PDB firm during design.
4. What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?
   Obtaining internal approval for long-term (10-20 year) contracts.
5. Has "smart" information technology supported your implementation/optimization in this area? If yes, please describe.
   SCADA technology helped us obtain real time electrical usage and demand data to assist in design and verification of wind and solar production.
6. Where could other utilities go to find additional information on this Activity Area or the activities/practices/programs that you implemented?
   WEF papers/presentations, AWWA papers/presentations

Measure *What are you measuring?*	Targets *What was your goal/intended outcome?*	Outcomes *What were your actual outcomes?*
Wind kWh Usage	70,000 MWh/yr.	60,000 MWh/yr.
Solar kWh Usage	6,300,000 kWh/yr.	6,400,000 kWh/yr.
Hydro turbine kWh savings	2,000,000 kWh/yr	2,000,000 kWh/yr.
Amount of CO2e reduced	70,000 tonnes CO2e (projected)	70,000 tonnes CO2e (projected)
% of total plant power generated internally	100% (Piscataway WRRF)	100% (Piscataway WRRF) projected starting in 2022
Annual cost savings (energy and biosolids hauling)	$3,000,000/yr. (Piscataway WRRF)	$3,000,000/yr. (Piscataway WRRF)
Increase in renewable energy production	46% by 2030	Projected 46% by 2022



Utility Description (combine all plants if a multi-site system)		
Utility Name: **Water Environment Services**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional System		
Service Area (square miles): 45 square miles	Average Annual Daily Flow or Demand (MGD): 18 MGD	
Population Served: 170,000		
Location		
Street Address: 150 Beavercreek Rd.		
City: State: Oregon City Oregon	Country: United States	
Zip Code/Country Code: 97045		
Utility Representative Contact Information		
Name: Greg Geist	Phone: 503-742-4560	Email: ggeist@clackamas.us

Organizational Culture

Water Environment Services ("WES") is a regional service provider formed from three separate utilities serving ~170,000 customers in Clackamas County, Oregon. The three partners -- Clackamas County Service District No. 1 (full-service sewer and surface water), the Surface Water Management Agency of Clackamas County (surface water) and Tri-City Service District (wholesale sewer) shifted to become full partners to better implement a vision of superior regional

service to their collective customers by forming WES as a joint partnership for all operational, budgetary and regulatory efforts. WES' mission is to provide resource recovery and watershed protection services to our community so we can live, work, and play in a healthy environment.

To best meet that mission, WES launched a process known as Performance Clackamas in 2014, seeking to orient itself to be deeply focused on customer service in all aspects of its business. Performance Clackamas establishes programs and metrics, which are published on an external website, to demonstrate the effectiveness of services delivered to customers.

WES' plan is derived from and consistent with the Effective Utility Management primer, with special emphasis on:

- enterprise resiliency;
- product quality;
- employee and leadership development;
- operational optimization;
- infrastructure strategy and performance; and
- customer satisfaction and community sustainability.

WES reorganized its budgeting and accounting structure to align with the Performance Clackamas program approach to provide greater transparency to our customers.

The metrics and goals of Performance Clackamas are intended to guide and support all employees every day. WES looks to celebrate its employees for their successes, whether it is a line crew for finding cross-connections or cleaning a clogged line before problems manifest, an engineer who efficiency manages rebuilding a failing pump, or a customer service representative who gracefully answers questions about rate increases from an upset caller. Staff are encouraged to provide suggestions and feedback on whether an approach is working, and input from all employees was included in establishing the metrics and goals of WES' Performance Clackamas initiative. WES holds quarterly organization-wide meetings where successes and employee efforts are celebrated.

One of the best ways to ensure our customers are satisfied is ensuring there is sufficient capacity to meet the needs of the community and protect the environment. WES has constructed a dual-operation Water Resource Recovery Facility (WRRF) utilizing both a conventional activated sludge and membrane bio-reactor treatment trains to generate exceptionally high quality effluent, and is the largest of its kind in Oregon. The Tri-City WRRF also houses model green roofs, pervious surfaces for storm water management, and purple pipe for water reuse. WES' service area is experiencing substantial growth, and WES is anticipating a 5-year capital improvement effort of approximately a quarter of a billion dollars. In each of our projects, our team brings the Performance Clackamas lens to its work to ensure that the final product will serve our community, customers, and the environment in the most effective and efficient way possible.

Having sufficient skills and talent in place to meet the current and growing needs of our customers is a significant driver in our Workforce development efforts. WES offers up to full tuition reimbursements for degrees and continued training. WES staff also administer and are the primary instructors for a regional week-long training and accreditation effort for wastewater and surface water utilities held annually at Clackamas Community College. WES has also recently adopted "Dashtrain," an online training access system designed to provide readily available training videos ranging from 30 seconds to 15 minutes in length. An app allows access in the field, so an employee can refresh on the best way to change out equipment, safety procedures, or just how to effectively utilize department software. It is used to support department-wide training and can be tailored down to individual or small work group needs. A customer-centric focus drives a desire for continual improvement, and this is an investment to support it.

WES believes that by having the best people, well trained and focused on customer service, it can foster a culture of excellence and service that will allow WES to provide effective and excellent resource recovery and watershed protection services to our community so that we can live, work, and play in a healthy environment.

PARTNERING & ENGAGEMENT

After the formalization of the Water Environment Services partnership, WES conducted a comprehensive communication and engagement outreach initiative to help it better understand what it needs to do to strengthen its relationship with the communities it serves. WES undertook several efforts to evaluate its internal and external communications and public involvement practices.

Thousands of people were made aware of the input opportunity via emails, mailed notices, social media, tours, phone calls, focus groups and meetings. After 30 years of excellent service, WES wanted the public to understand that its mission to protect public health, the environment and the county's economic vitality remained a top priority. WES also wanted its customers to understand how they can be involved in the conversation about services and issues that affect their communities and businesses.

WES leveraged this highly inclusive assessment process to reinforce lines of communication between elected officials, technical staff, ratepayers, stakeholders and businesses within the WES service area. In the spirit of collaboration and mutual respect, WES understood that creating new communication channels, engagement platforms and a single advisory committee would require both trust and buy-in from both customers and regional stakeholders.

What was the most critical obstacle that your utility had to overcome to be successful in this Activity Area, and how did you do that?

The obstacle WES faced early on, based upon a survey conducted by DHM Research in 2015 was the discovery that only 14% of its customers knew that WES was their service provider. The survey revealed that while 94% of WES customers approved of their wastewater treatment services, only 14% could correctly identify WES as their service provider, making it abundantly clear that WES needed to educate its customers on who they were and what they did. This confusion comes from the fact that WES provides wholesale services to four cities within its service area, which means WES customers receive their monthly bills from those cities instead of WES. This creates confusion for tens of thousands of customers about the identity of their service provider.

WES felt it was imperative that customers not only understand the need for capital improvement projects funded with public dollars, but supported these projects as well. The most urgent of these projects was the solids handling capacity improvement project which would ensure that WES would be able to continue accommodate rapid growth in the region. WES needed to act quickly to ensure its ratepayers and stakeholders were both informed and engaged in reshaping WES' communication and engagement efforts while simultaneously addressing the capacity issue at hand.

How did you go about implementing the practices/activities programs that you described in your opening paragraph?

WES responded by developing a comprehensive communication and engagement outreach initiative. To shape and guide the assessment WES hired public involvement firms EnviroIssues and Parini Connects.

The following goals and desired outcomes to steer the process:

2017-2020 COMMUNITY INVOLVEMENT GOALS

1. Consistently engage stakeholders regarding operations, rates and capital construction projects to ensure input is available to inform decision-making related to wastewater treatment and protection of rivers and streams.
2. Maintain and enhance relations with the business community, local governments, resident ratepayers and clean water advocates.
3. Ensure the Board of County Commissioners (BCC) as the governing body of WES understands and has access to opinions and input from stakeholders related to the wastewater systems and protection of rivers and streams.

DESIRED OUTCOMES

- Strengthened relationships with ratepayers.
- BCC receives public input to aid decision-making relating to WES.
- Increased visibility of WES as protector of public health, the environment, and ratepayer dollars.

- Enhanced “good neighbor” efforts.
- WES staff is well informed and engaged.
- A unified and balanced WES brand that supports surface water and wastewater services.

The assessment included several components:

- A review and analysis of the demographics within the WES service area to better understand the population and potential communication barriers.
- WES invited thousands of community members to engage in the conversation about how it can keep its customers and stakeholders informed and involved regarding current and future of wastewater and surface water services through online surveys and comment forms distributed at plant tours.
- WES invited leadership and employees to also provide input through two online surveys.
- WES held special forums for businesses, stakeholders and past advisory committees to ensure their input and ideas were included in the assessment and recommendation process.

Listed is a **summary of discoveries** gathered during the assessment and outreach phase.

Open houses/Tours at the Tri-City plant and participation in online survey show high interest in wastewater treatment and WES

- More than 180 people attended one of four open houses and tours in January and February.
- More tours are needed to handle the demand/interest.
- (86%) of attendees said they were “very satisfied” with WES services, while (12%) said they were “somewhat satisfied.”
- About 400 people accessed the online survey to give feedback on communications.
- In collective, more than 500 people provided feedback.
- Overall, public responses for WES services are quite positive.

Business Feedback

- Businesses want to stay engaged and informed. Several expressed an interest in participating on a committee or advisory group if that would help keep WES projects on track and on time.
- Concerns exist about potential moratoriums. Keeping the economy strong is a top priority. There is a desire for stability and predictability in WES decision-making processes and rates.

Giving Input and Receiving Information

- The majority of respondents to the online survey and open houses prefer online and digital methods, such as a survey, to provide input and receive information.
- WES employees have had much success engaging and educating ratepayers face to face and encourage more opportunities for direct engagement.
- People also report they prefer to obtain information about WES from emails, printed mailings, local newspapers, and social media.
- People report WES services are critical to the health and well-being of our environment, economy, quality of life, and communities.
- Past committee members and businesses emphasize WES must remain cost-effective and proactive in protecting its clean water investments over the long term.
- Past committee members reinforce WES needs to ensure rate payers and the communities it serves have a voice at the table with regards to fees, policies, rules and regulations and future investments.
- As it relates to growth, all groups indicated that WES needed to be more proactive in telling its story and helping its customers understand what it does and why it matters, regionally and locally.

Did you partner with other stakeholder organizations as a part of the implementation process?

A number of business, environmental and community-based organizations supported WES’ effort to improve its communication and engagement efforts.

Assessment outcomes include:

- Platforms for WES to share information:
  WES Tours: WES continues to offer tours at both facilities to area schools, businesses and community groups.

  WES Community Outreach and Education: WES created a tiered engagement strategy with emphasis on digital storytelling and education. It also made a commitment to attending events and festivals in each city it serves.

- Platforms for WES to consult with stakeholders:
  Online WES Community: WES recalibrated its online network of almost 6,200 subscribers. Changes include online panels and subgroups for soliciting input on key issues relating to specialty areas, such as surface water and customer service.

- Platforms for WES that involve stakeholders.
  WES Technical Advisory Taskforce: WES started a forum where technical staff from WES and served member cities' public works departments meet to discuss collaborative efforts on technical issues such as inflow and infiltration strategies, billing practices, working agreements, mutual aid, information sharing, etc**.**

  Tri-City Good Neighbor Committee: WES is currently working with its Tri-City WRRF host city and neighboring city to create a Good Neighbor Committee. Stakeholders will be encouraged to weigh-in on civic investment decisions benefiting their community. Examples include: pathways, beautification efforts, public amenities, lights and other projects.

- Platforms for WES that involve decision-making.
  WES Advisory Committee: WES created a single advisory committee to review, discuss, debate and make recommendations to the BCC on policy issues and programs of service area, and long range planning processes; and provide WES with feedback on policy, rules and regulations, financial and planning initiatives. The committee contains equitable geographic, environmental and business representation from throughout the service areas of the three partners.

- ***Elected Officials Forum:*** WES created a forum where elected representatives from its service area cities have opportunities to communicate concerns and feedback directly to the WES governing body, composed of the Board of County Commissioners.

What type and amount of resources were needed to support implementation?

WES has a team of two in-house communications specialists who handle media relations, community and business events, tours, digital outreach, educational materials and outreach, digital marketing and social media.

WES recently hired a part-time strategic communications project manager to aid in building stronger trust with its customers and stakeholders through the implementation of its newly approved strategic communication and engagement planning efforts.

WES invested approximately $58,000 over the past two years on research and public involvement services. WES also made a number of immediate communications and engagement investments which included the creation of educational videos at a cost of approximately $10,000. Approximately $50,000 a year is budgeted for its wastewater and surface water outreach and educational initiatives.

Has "smart" information technology supported your implementation/optimization in this area?

To improve its connectivity to its customers, WES created a series of informational videos and shared them via multiple of **smart technology** platforms and venues throughout the WES service area.

These platforms included:

- The Clackamas County Cable Channel;
- The county YouTube channel;
- Facebook;
- Twitter ;
- County website pages; and
- WES also used the videos at business and civic meetings.

The first video produced through Clackamas County Public and Government affairs entitled "WES – A Solid Plan for the Future" first aired on Dec. 21, 2015. Since then it has received thousands of combined views via the aforementioned channels. The video which feature a local family and WES leadership addressed:

- How WES protects public health and the environment;
- Who WES serves in its service area;
- Why is solids handling capacity shortage an issue and how it happened; and
- What the regional solution approach is.

An additional eight videos, titled, "Meet the WES Experts" introduced WES customers to WES employees who explained their job functions and commitment to WES mission.

Where could other utilities find additional information on the Activity Area?

WES url: http://www.clackamas.us/wes/
WES Engagement: http://www.clackamas.us/wes/advisorycommittee.html
WES: Videos https://www.youtube.com/watch?v=Vtda8e4L-Ww&list=PLZEzoOaZqnfqHRhgaucqkSUKdYA-p4fEi

Measure *What are you measuring?*	**Targets** *What was your goal/intended outcome?*	**Outcomes** *What were your actual outcomes?*
New WES Advisory Committee interest, approval and appointments	Creation of new WES Advisory Committee that fully meets charter and membership goals identified in bylaw to ensure BCC receives public input to aid decision-making	BCC approval of new single WES Advisory Committee #32 applicants applied from all service area communities and specialty categories, signifying high interest #16 appointments were made; meeting all charter and membership goals WES Advisory committee meetings have robust attendance and participation
Increased visibility and brand recognition of WES as protector of public health, the environment, and ratepayer dollars	Successful implementation of communication and engagement plan focusing on smart technology and use of educational videos	National Association for Counties Award Winner and Regional Emmy Nomination for "Meet the Experts" and "WES – A Solid Plan for the Future" videos Increase in visits to the WES web pages since the start of the program, including a 62% increase in unique views from January 2017 to January 2018
Participation and engagement from WES	Creation of forum to discuss matters of concern pertaining to policies and	BCC approval of Elected Officials Forum

service area elected officials	the future of wastewater within WES' service area between WES governing body and local elected officials.	Consistent attendance from mayors, city councilors and city managers Identification of issues to work on that have regional concern
Approval of capacity upgrades for Tri-City WRRF	Creating a cost effective and timely solution for solids handling capacity issue at Tri-City plant	In late 2016, the Board of Commissioners approved the solids handling capacity improvement project after receiving testimony, written letters of support and other communications from several members of the business community, county residents, and area elected officials

Utility Description (combine all plants if a multi-site system)		
Utility Name: **Western Monmouth Utilities Authority**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional Collection and Treatment System		
Service Area (square miles): 44	Average Annual Daily Flow or Demand (MGD): 7.2 MGD	
Population Served: 78,000		
Location		
Street Address: 103 Pension Rd		
City: Manalapan	State: NJ	Country: United States Of America
Zip Code/Country Code: 07726		
Utility Representative Contact Information		
Name: Rachael Brandt	Phone: 732-996-4300 x 104	Email: rbrandt@wmua.manalapan.nj.us

Organizational Culture

The Western Monmouth Utilities Authority endeavors to be a world-class public authority committed to leadership in environmental excellence. This is the vision of the Western Monmouth Utilities Authority, which we continue to strive

for on a regular basis. The factors that determine a world class authority according to Western Monmouth Utilities Authority correlate to the outlined practices of a "Utility of the Future Today."

One of the most pressing issues for utility authorities is succession planning, as many industry professionals that have been with authorities since the inception are now at the precipice of retirement. The amount of knowledge that has been acquired over their years of service is immeasurable. To retain and transfer the information they have, the Western Monmouth Utilities Authority pioneered an academy to educate newly appointed supervisors on all facets of authorities. The academy has four concise tracks to educate the supervisors on Authority Administration, Finance, Human Resources and Operations; giving them a baseline of applicable information. Through the academy the Western Monmouth Utilities Authority has certified forty percent of its staff as Environmental Professionals, in addition to the other 24 employees from neighboring authorities who participated. The Environmental Professionals meets monthly to discuss issues they have encountered in their respective departments and brainstorm on solutions; this also allows organic conversations between departments without the distractions of a normal office setting.

With less tradesmen coming into the workforce employee retention is critical; Western Monmouth Utilities Authority has an incredibly low turnover rate due in part to the employee enrichment program. Should a vacancy arise, typically due to retirement; we look internally and promote from within as often as possible. We acknowledge and reward our staff for their accomplishments by way of an internal honors program that recognizes each employee's triumph in longevity, workplace conduct and professional development. Additionally, we have employees' wellness programs that supply standing desks and ecologically friendly water fountains to enhance our employees' wellbeing.

A crucial facet to creating a collaborative atmosphere is communication between employees; Western Monmouth Utilities Authority has enacted a mentoring program to reinforce those conversations that may not have happened as naturally otherwise. The employees can choose their mentor, or ask to be assigned to a mentor; the mentors can be from Western Monmouth Utilities Authority or from neighboring authorities that have a likeminded vision. The conversations can be strictly professional, but we encourage our employees to get as much out of the mentoring relationship as possible. Some employees call or email intermittently with their mentors, while others choose a face to face meeting monthly; both situations have produced successful and meaningful relationships that our employees look to for insight.

The center of every forward thinking authority should always be leadership; the Executive Director of Western Monmouth Utilities Authority, Brian J. Valentino is undeniably passionate about creating a culture for collaboration. Furthermore, Brian works diligently with local authorities and in the communities serviced by Western Monmouth Utilities Authority to create a sense of community inclusive to the wastewater utility. In the past, the Western Monmouth Utilities Authority was considered a blot on the community, but through community engagement Western Monmouth Utilities Authority has been able to rebrand itself into an environmental facility focused on making the community better.

Western Monmouth Utilities Authority continues to strive for innovative ways to leave a smaller footprint on our environment through expanding solar fields and beneficial reuse of methane gas produced in the treatment process. Through these initiatives we are able to power half of the plant during daylight hours from the solar field, and heat the digesters and treatment buildings from the methane powered boilers. Our in-house staff has also developed and implemented two projects for the beneficial reuse of reclaimed water wherein reclaimed and treated water is used for non-potable purposes both in our wastewater treatment plant as well as in the maintenance of our large interceptor and collection system.

There are a multitude of reasons that confirm Western Monmouth Utilities Authority is an "Authority of the Future Today", which creates the opportunity for mutual growth that will come from this partnership. I am certain you will receive multiple entries, yet there is none as deserving and focused on the mission of being a "Utility of the Future" as Western Monmouth Utilities Authority. In the following narrative I will further elaborate on Western Monmouth Utilities Authorities partnering and engagement initiative.

Partnering and Engagement

Western Monmouth Utilities Authority has adopted the mission of becoming a world class authority, with a focus on engaging the communities we service. One of the most receptive groups of the communities is our children and the

Western Monmouth Utilities Authority has created several initiatives to involve the younger generations of our neighborhoods specifically. One of our most well received initiatives has been the Environmental STEM Explorer Post sponsored by Western Monmouth Utilities Authority. The Post meets monthly at Western Monmouth and utilizes Western Monmouth Utilities Authority staff that is passionate about our mission.

We also offer tours to schools, groups, or any member of the public in effort to showcase what we do as an authority and how we are making a positive impact on the environment. Western Monmouth Utilities Authority has public meetings twice a month with our board of commissioners, which gives the public an opportunity to address any issues they have encountered. Following each meeting our Western Monmouth Utilities Authority website is updated to reflect the minutes and agenda for any members of the public who was unable to attend. Social media has also been a great source of outreach for Western Monmouth Utilities Authority, while we are still in the infant stages of our Facebook and Twitter, the feedback that we have received thus far has been positive.

All of these initiatives are in effort to rebrand Western Monmouth Utilities Authority into a positive community anchor, a stark difference from our previous position of an unacknowledged vice. Partnering with the Association of Environmental Authorities for the Environmental Professional Development Academy has allowed Western Monmouth Utilities Authority to partner with several local authorities who are also focused on improving their community engagement. Western Monmouth Utilities Authority in continually thinking of ways that we can be more visible to the public.

A. How did you go about implementing the practices/ activities / programs that you described in your overview paragraph?
    - Initially, we brought our ideas of customer engagement and employee enrichment to our commissioners who were supportive and encouraging of our mission and continue to do so.
    - Our central objective is community engagement, so our first step as an authority was to make ourselves more visible and strengthen our customer service team. The easiest way to be more visible to the public is through social media; utilizing Facebook and Twitter we are able to showcase our school tours and Explorer program, while relaying pertinent information to the customer. With more transparency for our customers we appear as a more approachable utility which will naturally encourage engagement.
    - We also dedicate our time for Manalapan and Marlboro day; which are festivals for the residents of the town, to answer questions and supply information on our Authority.
    - We approached the Association of Environmental Authorities and worked with them to develop, administer and maintain the academy in partnership with Western Monmouth Utilities Authority. Western Monmouth Utilities Authority's Executive Director Brian Valentino continues to be the Academy Director on behalf of the AEA and is hosting our third cohort at Western Monmouth Utilities Authority.

B. What type and amount of resources were needed to support implementation?

- Our greatest resources was involving and utilizing Western Monmouth Utilities Authority employees. Our staff is equally as passionate about our mission and our pursuit of community engagement, so they often volunteer to be involved in our tours and other public outreach events. Our events require most of the 6-8 involved employees work day, there are also 2 employees who prepare the necessary materials for the tour, in total the average tour utilizes about 72 man hours (One full day from 8 employees and four hours each from 2 support employees.)
- Most of our initiatives are revenue neutral or produce a modest income. Since most of these initiatives go to our core mission of public education, the authority relies on our education budget to offset the small costs associated therewith. In term of the EPD Academy, the authority has a cost/revenue sharing agreement with the state AEA wherein we agree to host and run the academy for the entire state and pay nothing for our own members to attend. We also receive 50% of the revenue from the tuition paying members.

C. Did you partner with other stakeholders or organizations as part of your implementation process?

- Yes, we have an incredible working relationship with the towns we service and commissioners appointed to our board. We regularly approach them with our ideas of outreach and education; they are not only supportive but suggested ideas of how we can continue our efforts.
- The NJ Department of Environmental Protection, Rutgers University, the NJ Environmental Infrastructure Trust Program (I-BANK), several self insurance funds, the Society for Human Resource Management, the International City/County Management Association, the Association of Environmental Authorities and numerous county, regional and municipal governments were an incredible help in backing this project for outreach to other authorities interested in the professional development academy.
- The Monmouth Council, Boy Scouts of America have also served as a key partner both in terms of our Explorer Post and in the free and equal exchange of services. We use their local council camp (located ten minutes from our WWTP) for training, breakouts and retreats at no cost and in return we empty their septic tanks once a year at no cost.

D. What was the most critical obstacle that your utility had to overcome to be successful in this activity area, and how did you do that?

- Previously, most residents were unaware the Authority existed, let alone what we were doing for the environment; the residents who were aware of us had unfavorable opinions. Overcoming the stigma associated with a sewer authority was our paramount and most notable obstacle, which we continue to conquer with the understanding that some opinions will not change overnight but with perseverance change can occur.
- Another critical obstacle we had to overcome was endorsement from outside authorities with aligning visions. It was imperative for other authorities, the public and our commissioners to see the value in what we were trying to create as an Authority. To date there has been 54 graduates from the academy, with another cohort starting in June of 2018, which speaks to the value and perception of the academy.

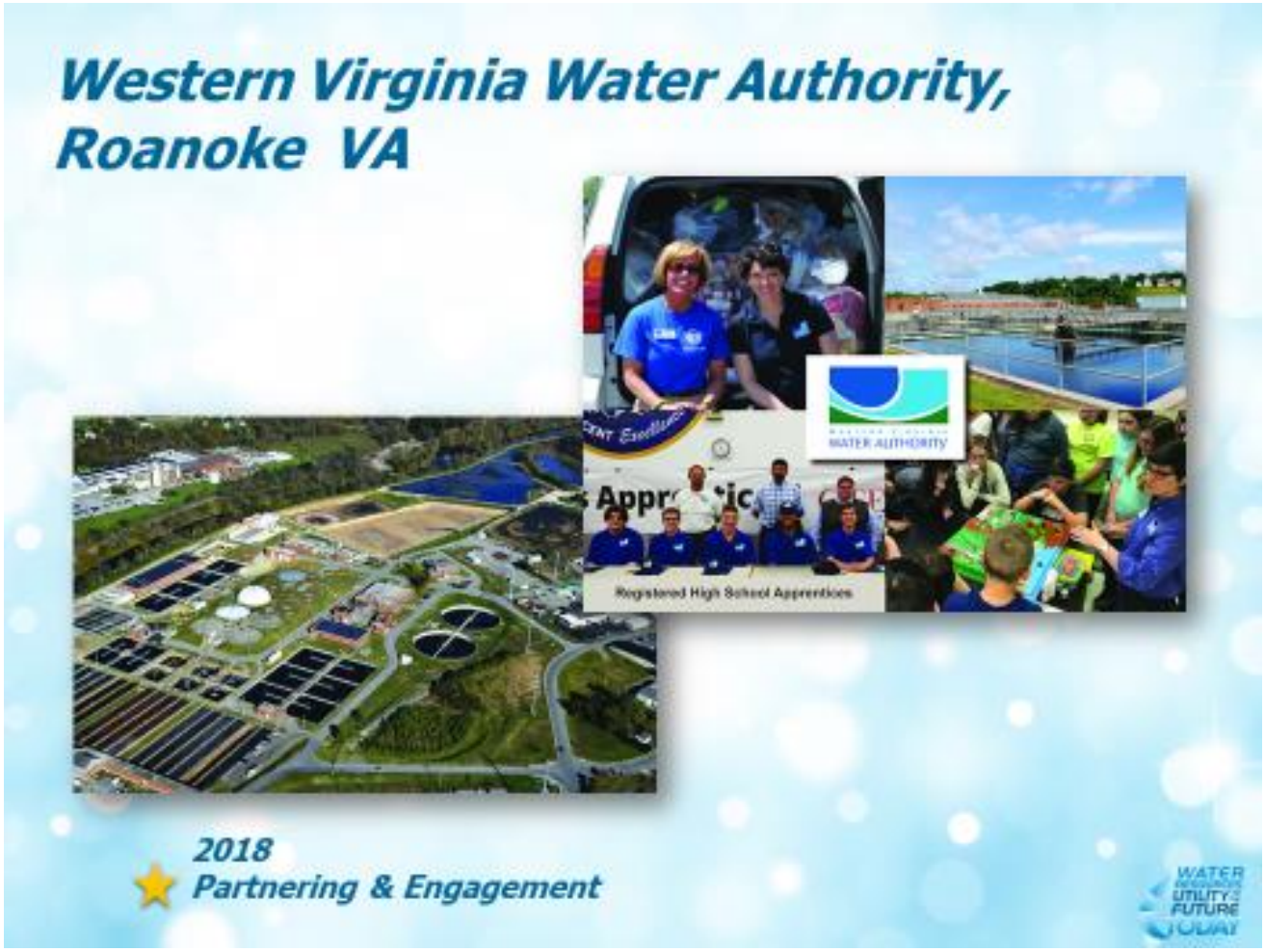
E. Has “smart” information technology supported your implementation/ optimization in this area? If yes, please describe.

- Yes, smart devices have made information relay, immediate. We are able to update our customers in real time with pictures and screenshots of the information important to them.
- The use of LinkedIn has also helped the academy outreach and networking for our employees.

F. Where could other utilities go to find additional information on this activity area or the activities/ practices/ programs that you implemented?

- WWW.WMUANJ.ORG
- http://aeanj.org/environmental-professional-development-academy/
- https://www.facebook.com/WMUANJ/
- https://www.facebook.com/Post1972/
- https://www.linkedin.com/company/western-monmouth-utilities-authority/
- https://www.linkedin.com/groups/8538292

Measure What are you measuring?	Targets What was your goal/intended outcome?	Outcomes What were your actual outcomes?
Public Outreach for WMUA on Facebook	Have 50 Facebook followers and post 3x weekly	40 followers and posts at least 2x a week
Increasing public education and tours	Have 5 tours in 2018	3 tours by May 2018
Having CEAS certified employees	Have 25% of staff certified	40% of staff is CEAS Certified



Utility Description (combine all plants if a multi-site system)		
Utility Name: **Western Virginia Water Authority (Authority)**		
Type (e.g., single plant, regional system, multiple plants, collection or distribution system only, stormwater, etc.): Regional system with 980 miles of collection system. The Roanoke Regional Water Pollution Control (WPC) Plant is permitted to treat 55mgd of flow from five local jurisdictions in the Roanoke Valley. Five stand-alone treatment facilities are also operated in the Franklin and Botetourt County service areas. Two of these facilities are advanced on-site wastewater treatment facilities. The Authority also owns and operates five drinking water treatment facilities and multiple groundwater well systems that produce an average of 19mgd of drinking water.		
Service Area (square miles): 1570 square miles: Cities of Roanoke and Salem, the Counties of Roanoke, Botetourt and Franklin and the Town of Vinton	Average Annual Daily Flow or Demand (MGD): 37mgd	
Population Served: 317,534		
Location		
Street Address: 1502 Brownlee Avenue, S.E.		
City: State: Roanoke, Virginia	Country: United States of America	
Zip Code/Country Code: 24014		
Utility Representative Contact Information		
Name: Sarah Baumgardner	Phone: 540.283.2905	Email: sarah.baumgardner@westernvawater.org

Organizational Culture

The Western Virginia Water Authority (Authority) owns and operates the Roanoke Regional Water Pollution Control (WPC) Plant, a 55 MGD facility with tertiary treatment. The facility discharge is governed by VPDES permit VA0025020. The cumulative elements of this permit create one of the most stringent discharge requirements in the Commonwealth of Virginia. In total the facility has over 7,000 compliance points annually with no exceptions granted in the permit structure. For the past twelve years, the facility has been Platinum rated by the National Association of Clean Water Agencies (NACWA). This high level of compliance protects our receiving river, the Roanoke River, and the popular 32 mi^2 Smith Mountain Lake that is located five miles downstream.

Starting in 2004 with the merger of the former Roanoke City and Roanoke County utilities to form the Western Virginia Water Authority, and later with the service expansion to provide water and wastewater service for our regional neighbors in Franklin (2009) and Botetourt (2015) counties, the Authority's organizational culture's has incorporated goals into our strategic plan and vision to enhance our environment, our community, our financial health and our workforce. Whether implementing the newest technologies in treatment and energy efficiencies, educating our next generation of customers or developing our current and future workforce, the Authority takes a proactive leadership role in our industry and our community. The Authority's commitment has been recognized with the NACWA Excellence in Management Recognition Award.

Started in January 2013, and substantially completed in FY16, the Peak Flow Enhancement Project allows the Water Pollution Control (WPC) Plant to fully treat and discharge more flow during high river stage events. The project involved construction of a new chlorine contact basin, new effluent screw pumps and modifications to the Biological Aerated Filter (BAF). The four new chlorine contact basins, which can hold over one million gallons, provide additional treatment capacity and offer system redundancy. Four Archimedes screw pumps are used when river stages are elevated and gravity feeding the flow into the river isn't effective. The Biological Aerated Filter (BAF) at the WPC Plant was modified to provide treatment from the equalization basins which enhances the overall peak treatment capacity of the facility and extends the storage capacity during wet weather events. These upgrades allow all flow leaving the plant to receive tertiary treatment. Modeling of the collection system as a whole, and manholes in particular, allow plant staff to proactively identify flow levels in the system and prevent potential wet weather overflows. This spring, staff conducted a trial of aerial thermal imaging for I&I detection with a company specializing in aerial infrared applications. The trial was aimed at locating missing manhole covers in flood prone areas that are difficult or time consuming to access by foot or road. The company overflew 30 miles of the Authority's sewer mains along creeks and located several manhole lids ajar that were then repaired by staff.

As the facility continues to focus on energy efficiency and sustainability, new blowers for the aerators at the Water Pollution Control Plant were installed and start-up testing was completed with the manufacturer's representative this past year. The new blowers are rated at 700 HP but deliver the same amount of air as 1000 HP blowers. In addition, they can be turned down to run at 350 HP during periods of lower demand. Methane gas, converted to electricity in the grant funded co-generation units, will be used to power the new blowers.

Enhancing the quality of life for our employees and our customer base is a key part of the culture at the Authority. This commitment is illustrated through the Authority's strong education outreach program, our staff's participation in the local United Way and Relay for Life campaigns and involvement on local non-profit boards, and our partnerships to provide recreational opportunities at our facilities. By working within the organization or in partnership with others, we are improving the quality of life in the community in which we all work and live.

The Authority has an established award winning outreach program (Water Environment Federation award) that offers free in-class and in-nature lessons to over 13,000 students each year. Two full-time and one part-time staff educators offer hands-on watershed experiences correlated to specific Virginia Standards of Learning for each grade to help students in our community learn more about protecting and preserving our environment and water resources. These hands-on experiences show tangible connections to the lessons students are learning in school and help them grow into adults passionate about our natural resources, desiring to work in the environmental field and striving to protect our

water and watersheds. Tours are offered of the WPC Plant for customers, all new employees and students. In fact, tours of our facility have been included in the curriculum for all Virginia Western Community College Micro-Biology students for the past several years. The WPC Plant is also a noted birding location, and birding passes and birding tours are offered to members of the community as well as out-of-town visitors. The birding program will be featured in an upcoming *Treatment Plant Operator* magazine article.

The Authority is also innovative in attracting a new workforce as seasoned employees reach retirement age. Facing an issue all too common in our industry – how to get skilled workers to fill roles left by retiring water and wastewater professionals, the Authority partnered with Roanoke County Schools to create a Registered Apprenticeship Program for high school students to train future water and wastewater treatment operators. Students will complete their apprenticeship program in three years and earn a Class IV Operator license at the end of the apprenticeship, becoming licensed professionals in Water and Wastewater. This program was selected as the Region Six winner of the 2018 Creating Excellence Business and Industry Partnerships Award.

Employees are also encouraged to participate in competitions such as the Operation Challenge team, equipment Road-E-Os and community parades. In 2017, the Authority's Operation Challenge team won the national completion and developed strong relationships with other wastewater professionals in Canada and the United States. All participants noted the bond that was created among the team and the education that came from working well as a team in a stressful situation. For four of the past five years, one of the Authority's sewer maintenance crew members has placed first in the Mid-Atlantic backhoe competition. Our Pre-Treatment Specialist, Lacy Burnette, was selected to compete on a two man team at the international IFAT World Water Skills event in Germany. Under the guidance of the WPC Plant's maintenance department and the Public Relations Department, parade floats are created for the community Christmas and St. Patrick's Day Parades. While the maintenance department's daily work of keeping the plant in peak operating form often goes unnoticed by the public, the parades give the technicians a chance for the citizens to see their work. After the parades, these floats (themes include the Polar Express with a life-size train, Rudolph the Red Noised Reindeer, and "Pot" of Gold) travel to local elementary schools to the delight of students or are repurposed into the Authority's booth at the local Relay for Life event. The Authority has been a consistent Best in Parade or Best Business Float winner for the past ten years.

A strong fiscal policy supports all these goals by maintaining a financially viable operation that can protect and manage essential water resources through delivery of quality water and wastewater service while remaining flexibility in order to continually adapt to local and regional economic and regulatory changes. The Authority sets fees and user charges which provide for reliable operation of the utility, continued commitment to replacing infrastructure, system improvements and provides for growth while maintaining a healthy financial standing and adequate reserves for contingencies. User rates are projected as part of the annual budget process for each of the next five years and are reviewed annually. The Authority considers the affordability of rates in the context of local wealth and income indicators and maintains user rates within a range of 1.0 to 1.5% of median household income. The Authority has received the Government Finance Officers Association (GFOA) Award of Excellence for Reporting every year of our existence.

Partnering and Engagement

The Authority is actively involved with stakeholder, business and community organizations to facilitate our enhancement of the well-being and quality of life of our regional community. Our partnerships and environmental education programs promote the awareness of water quality, watershed protection, quality of life and facilitate economic development. Staff looks for varied and unique opportunities that increase the understanding of these issues, leading to a better quality of life for our regional community.

Prescription Drug Task-Force and Take-Back Days. After seeing news reports in 2010 about medications showing up in the nation's waterways, the Authority took the proactive step to prevent this issue from impacting the Roanoke River. Staff partnered with the Roanoke Area Youth Substance Abuse Coalition (RAYSAC), a group that advocates and educates about preventing teen alcohol and medication abuse, local law enforcement and the U.S. Drug Enforcement Agency to host drug take-back days and create a task force to address improper disposal and diversion of medication. Drug take-back days have been a semi-annual event every year since 2010 with over 31,000 pounds of medication collected for safe disposal.

How the program was established: RAYSAC was concerned about prescription drug abuse among youth. Data shows that an increasing number of youth are getting drugs from family members or friends who have unused or expired prescription medications in their homes. The Authority wanted to protect our valley's waterways. Although testing indicated that the effluent from the Authority's Regional Water Pollution Control Plant did not contain a diverse or large quantity of prescription drugs, news reports indicated that this was a growing issue in our nation. By working together, we could be proactive in educating a diverse group of our valley's residents about the proper storage and disposal of prescription drugs.

RAYSAC and the Authority established the Roanoke Valley Rx Drug Task Force in November 2010 to provide the leadership to develop a community-wide strategic plan to address the environmental and health issues surrounding Rx disposal and misuse. Knowing that this was an issue that touched many groups in the community, representatives from youth serving agencies, environmental agencies, health care, law enforcement and concerned community members were gathered to focus on educating these multiple audiences within the community about the need and methods of proper drug disposal. The group, which still meets quarterly, has tackled issues such as changing perceptions of how to dispose of medication, the need for permanent drop boxes and the reduction in supply from over-prescribing. Questions regarding disposal habits and awareness were added to an existing yearly phone survey to provide quantitative data to the group.

As the Task Force planning was getting underway, the group hosted the first annual National Drug Enforcement Administration (DEA) Prescription Drug Take Back Day at one site in the City of Roanoke in September of 2010. Since that time, the number of take-back locations has swelled to 13 and are available in every locality we serve. To date, over 31,000 pounds of medication collected for safe disposal.

The Authority staff sits on the Task Force and helps staff the various take-back sites. The Authority provides promotion of the semi-annual take-back events on customer bills, on social media and in local media news reports.
The partnership between RAYSAC and the Authority was recognized as the 2012 National DEA Community Drug Prevention Program winner. For information about the program, please contact the Authority's public relations department at info@westernvawater.org

Measure	Targets	Outcomes
Awareness about proper medication disposal and diversion prevention	Increase awareness that medication put down a drain can lead to trace amounts of chemicals showing up in our waterways. Medication that isn't locked up or hidden can be diverted or abused.	A local phone poll conducted in 2010 showed that 48% of all respondents disposed of unused or expired medication by putting it down the drain. By 2015, 48% of respondents said they disposed of their medication at take-back events while only 20% were flushing medication. Over 31,000 pounds of medication has been collected since 2010 just in the Roanoke Valley.
Amount of medication collected at take-back events	Reduce the amount of medication flushed and increase the amount of medication turned in a take-back events	The first take-back event in 2010 collected 334 pounds of medication. Since then, 31,300 pounds of medication has been collected for safe disposal.
Awareness that flushing medication can lead to traces of drugs showing up in our drinking water	Increase knowledge that flushing medication can lead to traces of drugs showing up in our drinking water	A local phone poll conducted in 2010 showed that 54% of respondents answered "True" that flushing medications can lead to traces of drugs showing up in our drinking water. By 2017, 72% of respondents answered True to the same question.

Environmental Education and Outreach. The Western Virginia Water Authority is dedicated to nurturing and strengthening our commitment to water environment education. Educational outreach in the form of free in-class presentations, field trips to our treatment facilities, science fair support, social media promotion and community

outreach are offered to students and customers in the Western Virginia Water Authority's service area. Partnerships with other groups makes these programs a diverse educational experience.

Program execution: The Water Authority aims to meet educator instructional needs and enhance the environmental educational experience of area students. The Authority dedicates 2.5 staff members to our community relations programs while assistance is offered by other staff members during tours. We work closely with science representatives from area school systems to insure our programs are on-target with classroom curriculum and goals. All Western Virginia Water Authority educational programs are correlated to the Virginia Standards of Learning and are available for grades Kindergarten through 12 in any school in the service area.

Each program is specifically designed by grade level to reach and teach students with hands-on experiments, creative thinking and real-life application. In Virginia, students are required to have a Meaningful Watershed Educational Experience, so we partner with Clean Valley Council, local college students and Master Naturalists to take the students to a creek at one of our reservoirs or on school property. Students rotate through stations to look for benthic macro invertebrates, use probeware to test water quality and use a watershed model to understand how pollution impacts a body of water – and how best management practices can improve water quality. Educational programs for college students also serve as recruitment tools as students learn the science behind our treatment processes. The Authority provides an educational experience for over 13,000 students a year. Tours are also offered regularly for customers and civic groups. No one complains about wastewater rates after seeing all the treatment steps in a tertiary plant. Descriptions of our programs and a teacher request form are available at www.westernvawater.org/teacher

Inviting birders into our WPC Plant offers a unique way to educate the public about the high quality treatment and sustainable practices that occur at the facility. The WPC Plant offers several distinct habitats (river, forest, wetland, lake, grassland) for native and migratory birds. In fact, our facility is noted in birding literature as one of the best places to bird watch in the mid-Atlantic region and has enjoyed a long history as one of the primary stopover locations for migrating birds. Members of the Roanoke Valley Bird Club, the Roanoke Valley Greenways and Eagle Scout candidates have worked with Authority staff to develop gravel walking trails and three overlook platforms for the birders. Plant staff also worked with members of the club to create a bird watching permit process that includes safety lessons and plant overview materials. Permit holders are allowed to enter the plant property and watch the birds. Information about birding on the greenway or inside the plant is available on our website. www.westernvawater.org/birding

Measure	Targets	Outcomes
Participation in K12 educational programs	Reach over 10,000 students in the service area	Over 13,000 students participated in an Authority in-class or field trip experience during the 2017-18 school year.
Participation in college level educational programs	Have science or engineering college students participate in a program or tour	Students from Virginia Tech, Ferrum College, Roanoke College and Virginia Western Community College annually tour our treatment facility.
Participation in the birding program	Increase awareness through birding that clean treatment effectively supports wildlife	39 birding passes have been issued with eight signing-up this year.

Workforce Development. Faced with an aging workforce and a low unemployment rate in the region, the Authority was facing an issue all too common in the industry – how to get skilled workers to fill roles left by retiring water and wastewater professionals. At the same time, Roanoke County Public Schools Superintendent, Dr. Greg Killough, was working to find ways to prepare his students to meet the changing needs of the workforce while not falling victim to the immense growth in debt from student loans. The solution was to create a Registered Apprenticeship Program for high school students to train future water and wastewater treatment operators.

How the program was established: As the concept for this program was forming in 2016, Dr. Killough and Mike Altizer, the Authority's Water Operation AMI/SCADA Manager, discussed using the registered apprenticeship program to help the Water Authority meet their long-term employment needs while also giving students opportunities to enter a work

environment where their core academics and, in some cases, their technical training could be applied so that the student saw the relevance in what they were learning in schools. A program was created that struck a balance between the educational and financial needs of the student, the workforce and training needs of the Authority and the regulatory requirements of the Virginia Department of Labor and Industry (VDoLI) and the Virginia Department of Education (VDoE).

Courses taught at the high school using the general studies and CTE courses comprise the required 280 hours of Related Instructional courses and meet the VDOE's high school diploma requirements. Additional supplemental related courses are taught by the Authority using approved Sacramento State courses in Operations of Wastewater Treatment Plants Volume I & II and Water Treatment Plant Operation I & II. During the first two years while the students are still in high school, they are also training in the OJT portion of the job. The student's working schedule is very flexible those first two years as to allow full participation in a traditional high school experience. The third year of the apprenticeship program, the year after they graduate high school, is spent working forty hours a week in order to gain the required OJT needed sit for their Class IV Wastewater Treatment and/or Water Treatment license. Because the Registered Apprenticeship students get paid for OJT while at the Water Authority, they can get a jump-start on a career and avoid much of the college debt many of their peers would incur. Information is available at www.rcs.k12.va.us or info@westernvawater.org

Measure	Targets	Outcomes
Need to get skilled workers to fill roles left by retiring water and wastewater professionals	Hire registered high school apprentice students each year to mentor with existing Authority staff with the goal of the students achieving Class IV certification in three years.	Five students were hired the first year of the program (2017) with four remaining after one year. A second group of six students were hired as part of the 2018 class.
Offer non-college bound students a secure career so they remain productive members of the community	Students can graduate high school while preparing for the Class IV exam. One year after graduation, they will have a marketable skill in a secure industry.	The Apprenticeship program allows us to tap into a fresh group of individuals and allows us to grow our own. The students are excited about what they are learning and happy to have an income.

Mutual Aid Networks. The Authority spear-headed the effort to create a Public Works Academy to educate current and prospective employees in the Public Works field. Staff was also instrumental in creating a Utility Mutual Aid Network in Virginia (VaWarn) to document resources of member agencies, contact information, and pre-positioned agreements so that these items do not hinder emergency response situations. Formal and in-formal aid agreements are in place to offer assistance and expertise to smaller utilities in our region. We have allowed these smaller utilities use of our contracts to help them obtain better pricing and have invited them to training.

How the program was established: The Public Works Academy was formed to act as a regional training facility and has hosted chainsaw safety classes, training seminars and hosted the annual Industry and Public Works EXPO and Equipment Rodeos. Seminars focus on employee safety and recruitment training. The Academy is represented by utilities and localities in a 60-mile radius of the Roanoke Valley. The Authority offers meeting room space and staff serves as officers of the organization. VaWarn, which includes four state agencies (Virginia Tech and the Departments of Health, Environmental Quality and Emergency Management), industry groups and utilities, was formed when it became apparent after major disasters that it was critical to know where resources were available and how to effectively coordinate the initial response.

Members agree in advance to cost reimbursement and insurance structures in advance but are not obligated to provide assistance. Authority staff is also available to respond to help other utilities. Formal agreements exist with the Town of Fincastle to operate their water and wastewater facilities and with the Town of Boones Mill to assist with field work. Information is available at http://www.vawarn.org or info@westernvawater.org

Measure	Targets	Outcomes

Collaborative knowledge	Share training expenses and expertise regardless of utility or locality size	Consistent training is offered and utilities of all sizes benefit from each other's knowledge
Knowledge of how to get equipment and supplies in case of an emergency	Develop a Mutual Aid Agreement to facilitate resource sharing	VaWarn maintains a secure online data base of resources available from all members